RECIPES

FOR THE

COLOUR, PAINT, VARNISH, OIL, SOAP AND DRYSALTERY TRADES

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COLOUR, PAINT, VARNISH, OIL, SOAP AND DRYSALTERY TRADES.

COMPILED BY

AN ANALYTICAL CHEMIST

SECOND REVISED AND ENLARGED EDITION

LONDON

SCOTT, GREENWOOD & SON

"THE OIL AND COLOUR TRADES JOURNAL" OFFICES

8 BROADWAY, LUDGATE HILL, E.C.

1912

First Edition 1902
Second Revised and Enlarged Edition . *February*, 1912

PREFACE

TO THE

SECOND REVISED EDITION.

I PRESENT this Book of Practical Formulæ to the various trades for whom it caters in the hope that in its pages they will find much that may be useful to them. I do not lay claim to anything original in the formulæ, being well aware that many of them are old and well tried, but none the less deserving of a place in such a compilation. Every formula has been subjected to a scrutiny, and none has been inserted unless it was considered to be a practical working formula. Still a compiler can hardly be expected to have a full working knowledge of every one, so that it may be possible that one or two may not be so practical as appears on the surface. In such a case I would ask the forbearance of my readers.

It is of course assumed that users of these formulæ have some acquaintance with methods of manipulating them, and that they will also exercise a little common sense when applying them to their purposes.

The formulæ have been grouped together in sections, and at the end of each section reference is made to Textbooks and Trade Manuals that contain more and fuller information on the subject-matter than is possible to put in a book

like this. It is thought that this course will be very helpful to my readers.

The 1912 edition has been carefully revised and brought up to date, and a number of new recipes have been added, chiefly from the current columns of *The Oil and Colour Trades Journal.* The leather greases, varnishes, polishes, etc., have now been grouped in a separate section.

THE COMPILER.

CONTENTS.

SECTION I.

PIGMENTS OR COLOURS FOR PAINTS, LITHOGRAPHIC AND LETTERPRESS PRINTING INKS, ETC.

Special Chinese Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	0	0
Sulphate of iron	1	0	3
Sulphuric acid	0	0	12
Bleaching powder	0	0	20
Hydrochloric acid	0	0	1

Dissolve iron sulphate in 100 gallons of water and prussiate in bottom vat, then run down iron solution into the prussiate, stir well, allow to settle, run off top liquor. Then dissolve the chloride of lime in 30 gallons of water, pass through fine mesh sieve and add gently to blue (which should now be a greenish-looking pale blue). When all is in, stir, add 12 lb. of sulphuric acid. stir well once more, run vat full of water, wash three times, filter and press.

Fine Chinese Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	2	0
Sulphate of iron	1	2	0
Bichromate of potash	0	0	12
Sulphuric acid	0	2	20
Potash alum	0	0	14
Carbonate of soda	0	0	14

Dissolve prussiate in top vat, with 250 gallons of water, then in bottom vat dissolve iron in 200 gallons of water, let cool down to 90° F. Then run down potash into iron solution, well stirring, now let stand another hour, and run off top liquor; dissolve bichromate and run into the blue, stir well until fully oxidised, then add acid gently; fill up vat with water, wash well three times, filter

and press. In the case of fine blue, mix base, made by mixing the alum and carbonate of soda together, in 30 gallons of water and run into blue.

Chinese Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	0	0
Sulphate of iron	1	0	2
Chlorate of potash	0	0	14
Sulphuric acid	1	2	0

Deep Chinese Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash yellow	1	2	0
Sulphate of iron	1	2	0
Bichromate of potash	0	0	12
Sulphuric acid	0	2	20

Chinese Blue No. 2.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	0	0
Bichromate of potash	0	0	24
Sulphate of iron	1	0	4
Sulphuric acid	0	3	0
Potash alum	0	2	0
Carbonate of soda	0	2	0

Pure Blue Litho.

	Qr.	Lb.
Prussiate of potash yellow	3	0
Sulphate of iron	2	16
Sulphuric acid	1	14
Hydrochloric acid	1	16
Bichromate of potash	0	9

Dissolve prussiate of potash in bottom vat with 100 gallons of water. Then dissolve sulphate of iron in top vat; when dissolved, strain through fine muslin, and run down into potash solution, stirring all the time. Fill up vat with water, let stand until next day, then run off top liquor and add bichromate dissolved in 18 gallons of water, stir well and add acid gently; stir well for twenty minutes, turn on steam and boil for thirty minutes, then fill up with water, wash well in water, and dry slowly at a low heat.

Prussian Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	0	0
Sulphate of iron	1	0	3
Bichromate of potash	0	0	17
Sulphuric acid	0	3	0
Carbonate of soda	0	2	0
Potash alum	0	2	0

Prussian Blue No. 1.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	0	0
Sulphate of iron	1	0	3
Bichromate of potash	0	0	17
Sulphuric acid	0	3	0
Carbonate of soda	0	1	0
Potash alum	0	1	0

Blue Paste, 33 Per Cent.

	Cwt.	Qr.	Lb.
Prussiate of potash	2	2	0
Ferrous sulphate	2	2	0
Sulphuric acid	1	1	14
Bichromate of potash	0	1	21
Water	660 gallons.		

Liquid Fine Blue.

	Qr.	Lb.
Prussiate of potash	3	0
Sulphate of iron	3	4
Sulphuric acid	1	0
Bichromate of potash	0	9½

Soluble Blue.

Take 100 lb. of Prussian blue, mix well with about 100 gallons of water, and add 30 lb. of yellow prussiate of potash; boil well for three to four hours, drain on a filter, wash as before and dry.

Soluble Blue.

Dissolve 72 lb. of copperas in hot water, and pour this solution into a hot solution of 110 lb. of red prussiate of potash, and boil the mixture for two hours; filter, wash until the wash waters have a blue colour, then dry the residual blue.

RECIPES.

Soluble Blue.

Dissolve separately in water 100 lb. of yellow prussiate of potash and *80 lb* of copperas, add the two solutions together and boil for one hour; then add 20 lb. of nitric acid and 10 lb. of sulphuric acid, and boil one hour longer; then filter, wash and dry as before.

Bronze Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	1	16
Sulphate of iron	1	1	16
Sulphuric acid	0	2	6
Chloride of lime	0	0	14

Dissolve prussiate of potash in bottom vat with 150 gallons of water; in top vat dissolve the iron in 100 gallons of water, and when dissolved add another 50 gallons of cold water, then strain through fine mesh, and drop down into potash, boil up for fifteen minutes, fill up with water; allow to stand until next morning, then syphon off top liquor; have chloride of lime dissolved in 20 gallons of water, and run into blue precipitate well stirring all the time; now add acid gently, allow to stand twenty minutes, fill up vat with water; vat must be of a capacity of 800 to 1,000 gallons; wash well three times, filter and press in usual way.

Special Bronze Blue.

	Cwt.	Qr.	Lb.
Iron sulphate	1	1	4
Sulphuric acid	0	2	24
Prussiate of potash	1	1	4
Bichromate of potash	0	0	16

Dissolve iron in top vat in 100 gallons of water, then add acid; now dissolve the prussiate in bottom vat in 100 gallons of water, and drop down the iron into it. Boil up for fifteen minutes, and allow to cool to 85° F.; then add chromate solution boiling, wash well three times, filter and dry slowly.

Bronze Blue.

	Cwt.	Qr.	Lb.
Prussiate of potash	1	0	0
Sulphate of iron	1	0	0
Hydrochloric acid	0	1	0

		Cwt.	Qr.	Lb.
Sulphuric acid		0	0	14
Bichromate of potash		0	0	17
Base	Potash alum	1	0	0
	Carbonate of soda	1	0	0

Dissolve and run together whilst hot, then wash twice before adding to blue.

Antwerp Blue.

20 lb. of copperas, 10 lb. of alum, and 10 lb. of zinc sulphate are dissolved in 50 to 60 gallons of water, and to this solution is added one of 40 lb. of the red or yellow prussiate of potash, dissolved in 50 to 60 gallons of water. The blue is finished in the ordinary way.

Blue Lake.

100 lb. of barytes, 2 lb. Victoria blue R, 5 lb. of barium chloride. Mix the barytes and Victoria blue R in sufficient water, then add the barium chloride previously dissolved in water.

Lime Blue.

125 lb. of copper sulphate are dissolved in water, and to the solution is added 12½ lb. of sal ammoniac dissolved in warm water; 30 lb. of good clear quicklime are carefully slaked with water, and the slaked lime ground into a fine paste with water, after which it is made into a milk by adding more water. The milk of lime is poured into the copper solution, both being well mixed by constant stirring; when all the lime has been added a blue precipitate and a blue solution will be obtained; this colour mixture is allowed to stand until the solution has become colourless, taking care to stir it from time to time while the decoloration is proceeding. The blue pigment formed is filtered, washed with water and dried.

Blue Verditer.

A solution of copper sulphate of 1·312 (61½° Tw.) specific gravity is prepared and heated, and a hot solution of calcium chloride added until no further precipitate is obtained. The mixture is filtered, and the liquor, which consists of a solution of copper chloride, is diluted with water until it has a specific gravity of 1·157. Slaked lime is thoroughly ground with water to a great degree of fineness, and added to the copper solution in small quantities at a time, until all

the copper has been precipitated. The mixture is now filtered, drained, and washed, and a small portion of the paste weighed and dried as rapidly as possible to ascertain the amount of actual dry colour it contains. The green paste thus obtained is placed in wooden tubs, and for every 35 lb. of dry colour it contains, 5 lb. of the lime paste made as above described and 2½ pints of a solution of carbonate of potash of 1·116 (25¼° Tw.) specific gravity are added, and thoroughly stirred into it. The mass is allowed to stand, and when the proper shade has been developed it is washed with water, filtered and dried, when it is ready for use.

Brunswick Blue.

Mix 112 lb. barytes in sufficient water, add 10 lb. copperas and 5 lb. nitric acid, heat to boil; then add 10 lb. yellow prussiate of potash, allow to settle, wash well, then filter and dry.

Yellow Lake.

This is prepared from Persian berries, boiling 1 lb. of the berries with one oz. of cream of tartar, in 1 gallon of water, straining the clear decoction and adding sufficient alum to precipitate the lake.

Yellow Lake.

62 lb. of Glauber's salt, 10 lb. of Indian yellow G, and 70 lb. of barium chloride. Dissolve the Glauber's salt and Indian yellow G in sufficient water, then add the barium chloride previously dissolved in water.

Yellow Lake.

	Qr.	Lb.
Ammonia	3	0
Persian berry liquor	2	0
Alum potash	1	26
Cream of tartar	0	3

Put ammonia in bottom vat with Persian berries, boil up alum in top vat with 80 gallons of water, then when boiling run down into bottom vat; then add cream of tartar, keep well stirred until all is in, then run up with water until vat is full. Filter and press in the usual way.

Yellow Lake.

100 lb. of barytes, 3 lb. of Indian yellow G, 5 lb. of barium chloride, all separately dissolved and mixed together.

Yellow Lake.

100 lb. of barytes, 3 lb. of Auramine, 3 lb. of tartar emetic and 4 lb. of tannic acid. This lake is very good and a tolerably permanent one. Mix the barytes, Auramine, and tartar emetic in boiling water, and add the tannic acid.

Orange Lake.

62 lb. of Glauber's salt, 10 lb. of Orange extra E N 4, 70 lb. of barium chloride. Dissolve the Glauber's salt and Orange in water, then add the barium chloride.

Orange Lake.

100 lb. of barytes, 3 lb. of Croceine orange, 4 lb. of barium chloride. Dissolve the barytes and Croceine orange in water, and add the barium chloride.

Orange Lake.

100 lb. of barytes, 2 lb. of Bismarck brown, 2 lb. of Chrysoidine, 2 lb. of tartar emetic, and 4 lb. of tannic acid. Mix the barytes, Bismarck brown, Chrysoidine and tartar emetic with boiling water, and add the tannic acid, dissolved in water.

Zinc Chrome.

$61\frac{1}{2}$ lb. of zinc sulphate are dissolved in as small a quantity of water as possible, and the solution of $32\frac{1}{2}$ lb. of normal sodium chromate in water is added, and the mixture boiled for one hour, the zinc chrome is precipitated and can be collected on a filter, washed, and dried at a low temperature.

Zinc Chrome.

	Cwt.	Qr.
Lime	0	1
Potassium bichromate	1	0
Zinc sulphate	2	0
Sodium carbonate	1	0

Slake your lime and pass it through a fine sieve, say, 100 mesh, into your bottom vat; then dissolve bichromate in a 100 gallons of water, and run into bottom vat as cold as possible, stirring well all the time. Then dissolve sulphate of zinc in 200 gallons of water, let cool, and run into bottom vat with solutions. Now dissolve soda, let cool and strike.

Lemon Zinc Chrome.

The liquor from the deep chrome is boiled down until it has attained a strength of 26° Tw.; to every 8 gallons of this liquor 40 lb. of zinc oxide, previously dissolved in 24 lb. of sulphuric acid, are added; the mass is now boiled for one hour, the chrome allowed to settle, and, after decanting off the top liquor, washed and finished as usual.

Citron.

	Cwt.	Qr.	Lb.
Lead nitrate	2	0	0
White lead	2	0	0
Bichromate of potash	1	2	0
Whiting	0	1	20
Base { Alum	0	1	0
Base { Sodium carbonate	0	1	0

Citron Chrome.

	Cwt.	Qr.	Lb.
Lead nitrate	2	0	0
White lead	2	0	0
Bichromate of potash	1	2	0
Whiting	0	0	14
Base { Alum	0	1	0
Base { Sodium carbonate	0	1	0

Pure Primrose.

	Cwt.	Qr.
Nitrate of lead (dissolve in 200 gallons of water)	1	1
Carbonate of lead (grind in a 100 gallons of water)	1	1
Bichromate of soda	0	3
Sulphuric acid	0	2

Process.—Same as for lemon, with the exception that the liquors must be perfectly cold when striking.

Pure Pulp Lemon.

	Cwt.	Qr.	Lb.
Nitrate of lead	1	0	1
Carbonate of lead	1	0	4
Bichromate of potash	0	2	20
Sulphuric acid	0	2	0
Produces	2	1	24

Press in 20 per cent. of water.

Lemon Chrome.

	Cwt.	Qr.	Lb.
Nitrate of lead	1	0	0
Bichromate of potash	0	1	0
Sodium Sulphate	0	1	7
Carbonate of lead	0	2	0

Process.—Same as for lemon pure.

Lemon Chrome Pure.

	Qr.	Lb.
Nitrate of lead (water 100 gallons)	2	14
Bichromate of potash (water 56 gallons)	1	14
Carbonate of lead	2	14
Sulphuric acid	0	16

Dissolve the nitrate of lead in bottom vat, which must have at least 800 gallons capacity, and then run carbonate of lead (previously ground in water) into the nitrate liquor, now stir well. Have bichromate dissolving in top vat, and when dissolved run 50 gallons of cold water into it, then add the acid; see that liquor in bottom vat is not hotter than 150° F., then drop slowly down into it the bichromate liquor, well stirring all the time. When all is run in, add fresh water until the vat is full. Let stand until next morning, run off top liquor, and repeat the washing three times; afterwards it is ready for the press. Must be dried carefully at not too strong a heat.

Pure Lemon Yellow.

	Lb.
Lead acetate	100
Bichromate of potash	25
Glauber's salt (sodium sulphate)	35

Pure Chrome Yellow.

	Lb.
Lead acetate	100
Bichromate of potash	30
Glauber's salt (sodium sulphate)	31

Finest Middle Chrome.

	Cwt.	Qr.	Lb.
Nitrate of lead	1	1	0
Bichromate of potash	0	1	18
Caustic soda	0	0	3½
Potash alum	0	0	14
Soda crystals	0	0	14

Should a poorer quality be required, run into batch 5 cwt. of terra alba. Dissolve all, and strike exactly the same as for No. 1 Middle.

Deep Chrome.

	Cwt.	Qr.	Lb.
Nitrate of lead	1	1	0
Carbonate of lead	1	1	0
Bichromate of potash	0	3	3
Caustic soda	0	0	7
Produces	2	2	14

Dissolve nitrate of lead in 100 gallons of water in bottom vat, when thoroughly dissolved run in carbonate of lead. Dissolve bichromate of potash in 100 gallons of water. Then strike on lead solution whilst hot. When all is in, stir well and allow to settle; when settled run off top liquor level with precipitate. Dissolve caustic soda in 5 gallons of water, and run into chrome, stirring well; now fill up vat with water, wash well three times, filter and press. Dry in stove at moderate heat.

"Pure" Deep Chrome Yellow.

	Lb.
Lead acetate	100
Bichromate of potash	35

Pale Cologne Yellow.

	Lb.
Lead acetate	100
Potassium bichromate	17
Sulphuric acid	18

Medium Cologne Yellow.

	Lb.
Lead acetate	100
Potassium bichromate	18
Sulphuric acid	12

Deep Cologne Yellow.

	Lb.
Lead acetate	100
Potassium bichromate	25
Sulphuric acid	13

Lemon Chrome Yellow.

	Lb.
Lead acetate	100
Barytes	100
Potassium bichromate	35

Rich Middle Chrome.

	Cwt.	Qr.	Lb.
S. R. Chrome	1	0	14
Chinese blue	0	0	10½
Paris white	0	2	14
Barytes	0	0	14

Chrome Yellow.

	Lb.
Lead acetate	100
Barytes	200
Potassium bichromate	35

Deep Chrome.

	Lb.
Lead acetate	100
Barytes	75
Potassium bichromate	35

Finest Orange Chrome.

	Cwt.	Qr.	Lb.
Lead nitrate	1	1	0
White lead	1	1	0
Bichromate of potash	0	3	0
Lime	0	0	4
Caustic soda	0	0	7½
Alum	0	1	0
Sodium carbonate	0	1	0

Pure Chrome Orange.

100 lb. of lead acetate, 35 lb. of bichromate of potash or soda, and 9 lb. of caustic soda (77 per cent.) are separately dissolved in water, the lead solution is run into the precipitating tank, the bichromate run in, and chrome yellow precipitated; this is allowed to settle, the clear top liquor run off, and then the caustic liquor run on to the yellow; the mixture is heated until the desired shade is obtained. Allow the orange to settle, run off the top liquor, wash with water

two or three times, and when dried it is ready for use. This recipe will give a pure chrome orange.

Pure Orange Chrome.

	Cwt.	Qr.	Lb.
Lead nitrate	1	0	0
Potassium bichromate	0	1	7
Caustic soda	0	0	7
Lime	0	1	0

Orange Chrome.

	Cwt.	Qr.	Lb.
Nitrate of lead	1	1	0
Carbonate of lead	1	1	0
Bichromate of potash	0	3	0
Lime	0	0	4
Caustic soda	0	0	7½
Alum	0	1	7
Carbonate of soda	0	1	7
Paris white	2	0	0

Common Chrome Orange.

Pale orange. Make a yellow from lead acetate, 100 lb.; barytes, 200 lb., and bichromate 35 lb.; then add 10 lb. of quicklime freshly slaked; boil till the shade has been developed; wash and dry the pigment.

Pure Scarlet Chrome.

Dissolve 100 lb. of lead nitrate, 35 lb. of bichromate, and 12½ lb. of caustic soda (77 per cent.) each separately in water. Add the bichromate solution to the lead solution, allow the yellow precipitate to settle, run off the clear top liquor, then add the caustic soda solution and boil up the mixture, continuing the boil until the required scarlet shade has been fully developed, then wash, dry and finish the pigment in the usual way.

Chrome Red.

100 lb. of white lead, 30½ lb. of potassium bichromate, neutralised with caustic potash, and 50 gallons of water are mixed together and allowed to stand for two days, the mixture being stirred up at intervals. The mass is now boiled for half an hour or so until the red colour develops; it is allowed to settle, the top liquor run off, the

colour washed twice with water and once with weak sulphuric acid (4 lb. in 40 gallons of water), then dried.

Lithographic Orange.

	Cwt.	Qr.	Lb.
Bichromate of potash	0	2	14
Carbonate of soda	0	2	14
Lime	0	0	20
Nitrate of lead	1	0	14
Carbonate of soda	2	0	0

Yellow for Floorcloth and Letterpress Ink.

	Cwt.
S. R. Chrome	2
Mid Solid	2

Run under edge-runners thirty minutes.

G Chrome for Floorcloth and Letterpress Ink.

	Cwt	Qr.
Potassium bichromate	1	0
Soda	1	0
Lime	2	3
Lead nitrate	1	3

Red Tint Chrome.

	Cwt.	Qr.	Lb.
Potassium bichromate	0	3	14
Soda	0	3	14
Lime	0	1	8
Lead nitrate	1	1	0

Chrome Orange for Litho.

	Cwt.	Qr.	Lb.
Potassium bichromate	2	2	16
Soda	2	2	16
Lime	1	1	14
Lead nitrate	4	3	14

Lithographic Orange—Solid, Pure.

	Cwt.	Qr.	Lb.
Bichromate of potash	0	2	14
Carbonate of soda	0	2	14
Lime	0	0	15
Nitrate of lead	1	0	14

Orange Carmine.

1 lb. of Persian berries is boiled in 1 gallon of water and the liquor strained, then 1 lb. of muriate of tin (commercial stannous chloride solution) added, and sufficient sodium carbonate to precipitate the lake which is collected, washed and dried. This lake has a bright orange colour and is chiefly used by calico printers.

Carmine.

9 oz. of sodium carbonate, 8 oz. of citric acid and 27 quarts of water are boiled together, then 1½ lb. of cochineal are added and the mixture boiled for one and a half hours, strained and clarified; the liquor is heated to the boil, and 9 oz. of alum are added; the mass is then boiled for five minutes longer and allowed to stand for three days, when the carmine precipitated is collected, washed and dried.

Carmine.

1 lb. of cochineal is extracted by boiling in water for from fifteen to twenty minutes, the decoction is strained off, 1 oz. of alum is added, and the boiling continued for a few minutes longer, the clear liquid is decanted off, and 1 oz. cream of tartar added, the mass is then allowed to stand for the carmine to settle.

Carmine Crimson O 1.

	Qr.	Lb.
Cochineal	1	12
Tartar	0	5
Sulphate of alum	0	3
Cream of tartar	0	10
Ammonia	0	27
Potash alum	0	14

Scarlet Carmine O 1.

	Qr.	Lb.
Cochineal	0	20
Tartar	0	2½
Alum sulphate	0	1½
Cream of tartar	0	5
Ammonia	1	26
Potash alum	3	0

Boil up 40 to 50 gallons of water; when at boiling-point add the cochineal, then continue the boiling for ten minutes longer, pass

through fine sieve, 80 mesh. Throw into the cochineal liquor the tartar, gently turn on the steam for three minutes, then turn off again, add gently the powdered alum sulphate; let steam be off again for five minutes, then run into bottom vat and add gently the cream of tartar; let stand until settled, run off top liquor, and add base made from the potash alum and ammonia.

Rich Carmine O 2.

	Qr.	Lb.
Cochineal	1	2
Tartar	0	2¾
Alum sulphate	0	1½
Cream of tartar	0	5
Ammonia	1	26
Potash alum	3	0

Rich Scarlet Lake.

	Qr.	Lb.
Cochineal	1	12
Tartar	0	5
Sulphate of alum	0	3
Cream of tartar	0	10
Ammonia	0	27
Potash alum	1	14
English vermilion	0	7

Carnation Lake.

Water	42 gallons
Cochineal	12 lb.
Tartar	1½ lb.
Alum	¾ lb.

Boil up water, and add cochineal; boil now for fifteen minutes, turn off steam and add the tartar, then carefully add alum; if it should not rise, boil up until it does, pass through sieve and stand for two days, and add 1½ lb. nitrate of tin.

Pure Carminetta.

	Cwt.	Qr.	Lb.
Orange lead	1	2	0
Barytes	1	0	0
Eosine	0	0	12
Tannic acid	0	0	12
Tartar emetic	0	0	12

Dissolve eosine in 24 gallons of water in top vat, in bottom vat mix in 45 gallons of water, orange lead and barytes to form a creamy paste, drop eosine into same and stir well. Then dissolve acetate of lead, or the tannic acid, and drop also into bottom vat; lastly, dissolve the tartar emetic and run down, then stir well for twenty minutes, fill up vat with water (200 gallons), filter next day, and press.

No. 1 Carminetta.

	Cwt.	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	15
Acetate of lead	0	0	20
Barytes	0	0	14

Carmetta Pure.

	Cwt	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	15
Acetate of lead	0	0	20

Royal Reds.

	Cwt.	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	5
Acetate of lead	0	0	7½
Sulphate of alum	0	0	4

Put orange lead into bottom vat, and add sufficient water to form a thick paste. Dissolve acetate of lead in 40 gallons of water in top vat, and run down into orange lead base, stir well. Dissolve Eosine dye in stone jar in 20 to 30 gallons of water and drop down into base, stirring well all the time. Then run in alum solution; when all is in stir for about ten minutes, fill up vat with water, give two washings, filter and press.

Deep Royal Red.

	Cwt.	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	12
Acetate of lead	0	0	15
Base { Carbonate of soda	0	1	0
Base { Alum sulphate	0	1	0

When a good fracture is required the addition of this base will give a good crispness to the Royal reds when sold in drops.

Deep Royal Red, No. 2.

	Cwt.	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	12
Barytes white	0	2	0
Acetate of lead	0	0	15

Royal Red, Middle, No. 1.

	Cwt.	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	8
Acetate of lead	0	0	12
Sulphate of alumina	0	0	6

Middle Royal Red, No. 2.

	Qr.	Lb.
Orange lead	2	14
Barytes	1	14
Acetate of lead	0	12
Eosine L.	0	8

Royal Red.

	Cwt.	Qr.	Lb.
Orange lead	1	0	0
Eosine L.	0	0	5
Acetate of lead	0	0	7½
Sulphate of alumina	0	0	4
Barytes white	0	1	0

Alizarine Lake Red.

	Cwt.	Qr.	Lb.
Barytes	2	0	0
Alizarine	0	1	12
Alumina sulphate	0	0	20
Acetate of lime	0	0	4
Soda crystals	0	0	20

Well mix the barytes into 100 gallons of water, now mix the alizarine in 50 gallons of water, and run into barytes, stir well; next dissolve the alum in 30 pints of water, and drop down also on base; add acetate of lime previously dissolved in water (10 gallons);

and boil up the whole for about forty minutes, then add gently, a little at a time, proportions of soda crystals.

Alizarine Lake.

	Lb.
Pure alizarine	15
Alum sulphate	10
Acetate of lime	$1\frac{1}{2}$
Soda crystals	10

Dark Alizarine Red Lake.

Diffuse 100 lb. of barytes through 50 gallons of water, add 20 lb. of alizarine, 10 lb. of alumina sulphate, and 2 lb. of calcium acetate, stir well together, and then allow the mixture to stand for two or three hours, stirring at intervals to keep the ingredients well mixed. Heat slowly, so as to take about two hours to reach the boiling point, and at intervals add portions of a solution of 10 lb. of soda crystals.

Pure Alizarine Lake.

Mix 5 lb. of ordinary commercial alizarine with 6 gallons of water, then add $2\frac{1}{2}$ lb. of alumina sulphate previously dissolved in water, and 8 oz. of calcium acetate also dissolved in water; boil the whole together for about an hour, then add $2\frac{1}{2}$ oz. of soda crystals, dissolved in water in small quantities at a time, at intervals long enough to allow of the subsidence of the effervescence thus set up. The whole mass is now boiled for about an hour, then allowed to stand for twenty-four hours, filtered, washed and dried. This makes a dark red lake of good body and staining power. The shade or tint will depend upon the kind of alizarine used.

Alizarine Scarlet Lakes.

A very fine lake is made in the following manner: $6\frac{3}{4}$ lb. of alumina sulphate are dissolved in 20 gallons of water, to this is added the solution of 1 lb. of calcium chloride in one gallon of water, and immediately after a solution of $4\frac{1}{4}$ lb. of soda ash dissolved in 10 gallons of water. A precipitate of alumina is obtained, mixed with some sulphate of calcium, this precipitate is collected and well washed. It is now diffused through 10 to 15 gallons of water, and there is added 3 lb. of alizarine, 1 lb. of Turkey red oil, and $1\frac{1}{2}$ oz. tannic acid; the mixture being heated to from 160° to 165° F. and kept at that heat for about half an hour, when $\frac{1}{2}$ lb. more of Turkey

red oil is added. Then the whole mass is boiled for one hour, after which the lake is ready for washing and drying. It is important that the sulphate of alumina used be free from iron, and that during the process of making the materials be kept free from contact with the metal, or the colour of the lake will be deteriorated.

Crimson Red Lake.

14 lb. of alpha-naphthylamine are gently heated with 30 lb. of hydrochloric acid, and 20 gallons of water until completely dissolved. The solution is then slowly poured into 30 gallons of water. The beta-naphthylamine will be precipitated as hydrochloride in the form of a fine white or faintly coloured precipitate. This is of no moment provided it be fine and not lumpy in character. The mixture must be allowed to become quite cold before passing on to the next stage. A solution of 10 lb. of sodium nitrite in 10 gallons of cold water is made and then poured slowly into the alpha-naphthylamine mixture, the whole being kept constantly stirred for from one-half to three-quarters of an hour, when the operation will be ended. There is next added 30 lb. of sodium acetate dissolved in 25 gallons of water, and 150 lb. of barytes. To this mass is added slowly a solution of 14 lb. beta-naphthol in 4 lb. of caustic soda and 30 gallons of water. The lake forms at once, and is washed, filtered and dried in the usual manner.

Scarlet Lake.

14 lb of paranitroaniline are mixed with 30 lb. of good hydrochloric acid (it is best to use the pure acid, as the impurities in the commercial grades are liable to effect the brightness of the lake), and 25 gallons of boiling water. This mixture is well stirred until all the paranitroaniline is dissolved, allowed to cool, 25 gallons of cold water are added, and then slowly and with constant stirring 10 lb. nitrate of soda dissolved in 10 gallons of water is added into the paranitroaniline mixture. This stage being the most important, special care should be taken to make the solutions quite cold and to mix the ingredients slowly. After about one-half to three-quarters of an hour the preparation will be ready for the next stage. To the mixture is added 150 lb. of barytes or other white base, and 30 lb. of acetate of soda dissolved in 25 gallons of water. Next 14 lb. of beta-naphthol are dissolved with a little heat in 4 lb. of caustic soda (77 per cent.), and 25 gallons of water; 25 gallons of cold water are then added, and, when the whole is cold, the

beta-naphthol solution is added slowly and with constant stirring to the preparation of paranitroaniline. The scarlet lake forms at once, and can be filtered, washed and dried in the usual way, but in drying the temperature must be kept low.

Madder Lake.

1 lb. of garancine, and 1 lb. of sodium sulphate are boiled together in 16 pints of water, to the mixture is added 1 lb. of alum previously dissolved in water, and the mass allowed to stand for some time for the alum to extract the colouring principle of the garancine; the mass is next strained, and to the clear liquor is added 1 lb. of lead acetate, lead sulphate is precipitated and this is filtered off; on boiling the clear filtrate the lake formed is collected, washed and dried.

Crimson Lake No 1.

	Cwt.	Qr.	Lb.
Sulphate of alumina	1	0	0
Carbonate of soda	1	0	0
Erythrine B	0	0	15
Eosine G G F	0	0	7½
Barium chloride	0	0	14
Nitrate of lead	0	0	18

Crimson Lake No 2.

	Cwt.	Qr.	Lb.
Sulphate of alumina	1	0	0
Carbonate of soda	1	0	0
Erythrine B	0	0	15
Eosine G G F	0	0	7½
Barium chloride	0	0	14
Nitrate of lead	0	0	18
Barytes white	0	2	0

Sulphate of alumina is dissolved in top vat with 80 gallons of water, and carbonate of soda in bottom vat in 80 gallons of water; when thoroughly dissolved the alumina solution is run down on to the soda solution, stirring well the whole time. Then the Erythrine B and Eosine are dissolved in 80 gallons of water and dropped down into base mixture in bottom vat. Now dissolve barium chloride in top vat, and nitrate of lead in centre vat, and run both down also into bottom vat, stirring well. When all is in, fill up vat with water, wash three times, and filter and press in the usual way.

Pure Permanent Red.

	Cwt.	Qr.	Lb.
Sulphate of alumina	1	0	0
Soda crystals	1	0	0
Caustic soda	0	0	2¼
Phosphate of soda	0	1	25
Milling red G	0	1	0

Scarlet Antimony.

1 lb. of tartar emetic and 3 lb. of tartaric acid are dissolved in 1½ gallons of water, and the solution heated to 40° F., a solution of sodium thiosulphate of 40° Tw. added, and the mixture heated to 180° F. The red is gradually precipitated, and when fully formed is washed with water and dried.

Plum Lake.

100 lb. of barytes, 3 lb. of Acid mauve B., 15 lb. of barium chloride. This gives a red shade of plum lake.

Bluish Pink Lake.

100 lb. of barytes, 3 lb. of Rhodamine, 3 lb. of tartar emetic and 3 lb. of tannic acid. This makes a lake of a peculiar shade of bluish pink, which is fairly resistant to exposure to light and air.

Magenta Lake.

100 lb. of barytes, 1 lb. of Magenta, 1½ lb. of tartar emetic and 1½ lb of tannic acid, make a lake of deep crimson colour. Mix the barytes, Magenta and tartar emetic with boiling water and add the tannic acid.

Scarlet Lake.

Dissolve in the precipitating vat 62 lb. of Glauber's salt, and 10 lb. of Scarlet F R R, into this solution is run a solution of 70 lb. of barium chloride, the lake which is precipitated out is finished in the usual way.

Scarlet Lake.

Mix in the precipitation vat ½ lb. of Eosine A, 5 lb. of Croceine scarlet M, and 33 lb. of Glauber's salt. In separate vats dissolve 25 lb. of barium chloride and 16½ lb. of lead acetate, when ready run the barium chloride solution into the colour mixture, and then run in the lead solution. A very bright scarlet lake is thus obtained.

Deep Crimson Lake.

100 lb. of barytes, 20 lb. of Amaranth, 60 lb. of barium chloride. A little addition of sodium carbonate completes the precipitation. Mix the barytes and Amaranth in sufficient water, then add the barium chloride.

Scarlet Lake.

100 lb. of barytes, 3½ lb. of Croceine scarlet M, 10 lb. of lead acetate. A little ammonia completes the precipitation. Mix the barytes and Croceine scarlet in water and add the lead acetate.

Scarlet Lake.

100 lb. of barytes, 5 lb. of Lake scarlet G, 20 lb. of lead acetate. Mix the barytes and Lake scarlet in water, then add the lead acetate.

Bluish Scarlet Lakes.

100 lb. of barytes, 3 lb. of Lake scarlet 2 R J, and 10 lb. of barium chloride. Mix the barytes and Lake scarlet with water and add the barium chloride.

Pale Crimson Lake.

100 lb. of barytes, 2 lb. of Safranine prima, 2 lb. of tartar emetic, and 3 lb. of tannic acid. The lake obtained is a fine shade of crimson.

Dutch Rose Pink.

	Cwt.	Qr.	Lb.
Sapan wood	3	0	0
Lime	0	1	0
Alum	0	1	0
Terra alba	2	0	0
Paris white	0	2	0
Acetate of lead	0	0	7

Deep Rose Pink.

	Cwt.	Qr.	Lb.
Sapan wood	3	0	0
Lima wood	3	0	0
Paris white	1	2	20
Alum	0	2	10
Lime	0	0	12

Rose Pink.

	Cwt.	Qr.	Lb.
Sapan wood (150 gallons water) . .	1	0	0
Lima wood (100 gallons water) . .	1	0	0
Paris white	2	0	0
Sulphate of alum (50 gallons water) .	0	2	10

Boil the Sapan and Lima wood well together for three hours, then strain through fine mesh into bottom vat, now drop in whiting and stir well, then dissolve alum and run into the base, stirring gently whilst running in.

If a deeper shade is required, slake 12 lb. of lime and run into the whole base. Let stand for two days; run off top liquor, and drop into drops on trays for the stove to dry at about 95° F.

Light Brunswick Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	8
Sulphate of iron	0	0	8
Bichromate of potash	0	0	4
Sulphuric acid	0	0	4
Nitrate of lead	1	1	0
Carbonate of lead	1	1	0
Bichromate of potash	0	3	0
Sulphuric acid	0	2	4
Barytes	2	0	0
Terra alba	2	0	0

Light Brunswick Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	16
Sulphate of iron	0	0	16
Bichromate of potash	0	0	2
Sulphuric acid	0	0	7
Nitrate of lead	1	1	0
Carbonate of lead	1	1	14
Bichromate of potash	0	3	2
Sulphuric acid	0	2	0
Barytes	4	0	0
Terra alba	4	0	0

Middle Brunswick Green Pure.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	24
Sulphate of iron	0	0	24
Bichromate of potash	0	0	5
Sulphuric acid	0	0	2
Nitrate of lead	1	1	0
Carbonate of lead	1	1	0
Bichromate of potash	0	3	3
Sulphuric acid	0	2	4

Brunswick Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	24
Sulphate of iron	0	0	24
Bichromate of potash	0	0	5
Sulphuric acid	0	0	12
Nitrate of lead	1	1	0
Carbonate of lead	1	1	14
Bichromate of potash	0	3	0
Sulphuric acid	0	2	4
White barytes	2	2	0
Terra alba	1	2	0

Pure Deep Brunswick Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	2	0
Sulphate of iron	0	2	4
Bichromate of potash	0	0	3
Sulphuric acid	0	0	14
Nitrate of lead	1	1	0
Carbonate of lead	1	1	0
Bichromate of potash	0	3	0
Sulphuric acid	0	2	4

In working all these Brunswick Green formulæ add the barytes and terra alba to the bottom vat, then run in the lead, bichromate and sulphuric acid in turn to form the yellow, and finally the iron, prussiate, bichromate and acid to form the blue part of the green; when all are added allow to settle, wash and finish in the usual way.

Pale Brunswick Green.

1 cwt. of barytes, 1½ lb. of Prussian blue, and 35 lb. of chrome yellow; grind all together.

Middle Brunswick Green.

1 cwt. of barytes, 2½ lb. of Prussian blue, and 35 lb. of chrome yellow; grind all together.

Deep Brunswick Green.

1 cwt. of barytes, 5 lb. of Prussian blue, and 35 lb. of chrome yellow; grind all together.

Extra Deep Brunswick Green.

1 cwt. of barytes, 8 lb. of Prussian blue, and 35 lb. of chrome yellow; grind all together.

Pale Brunswick Green.

1 cwt. of barytes, 13 lb. of acetate of lead, 1 lb. of copperas, 1 lb. of yellow prussiate of potash, and 4 lb. of bichromate of potash.

Middle Brunswick Green.

1 cwt. of barytes, 13½ lb. of acetate of lead, 1½ lb. of copperas, 1½ lb. of yellow prussiate of potash, and 4¼ lb. of bichromate of potash.

Deep Brunswick Green.

1 cwt. of barytes, 14 lb. of acetate of lead, 2 lb. of copperas, 2 lb. of yellow prussiate of potash, and 4½ lb. of bichromate of potash.

Extra Deep Brunswick Green.

1 cwt. of barytes, 16 lb. of acetate of lead, 4 lb. of copperas, 4 lb. of yellow prussiate of potash, and 5 lb. of bichromate of potash.

Scheele's Green.

1 part of powdered white arsenic (arsenious oxide), and 2 parts of potash (carbonate of potassium), are dissolved by boiling in 35 parts of water; the solution is filtered and then poured into a solution of 2 parts of copper sulphate as long as a precipitate falls. The precipitate is collected on a filter, washed with water, and dried at a gentle heat.

Emerald Green.

100 lb. of copper sulphate are dissolved in water, and sufficient sodium carbonate (28¾ lb. of soda crystals or 12½ lb. of crystal carbonate) is added to precipitate part of the copper sulphate used in the form of copper carbonate, then acetic acid is added in sufficient quantity to dissolve this copper carbonate. There is thus obtained a solution containing copper acetate and copper sulphate. The copper sulphate has now to be converted into copper arsenite, to do this 60 lb. of white arsenic are dissolved by boiling in sodium carbonate (38 lb. of crystal carbonate, or 87½ lb. of soda crystals), the two solutions are heated to the boil and then the arsenic solution is run into the copper solution, the green is formed immediately, and only requires filtering, washing and drying for use as a pigment. When carefully carried out this process gives excellent results.

Emerald Green.

	Cwt.
Arsenious acid	3.
Soda crystals	4
Sulphate of copper	4
Acetic acid (25 per cent. strength)	60 gallons.

Dissolve the soda crystals in 50 gallons of water contained in a steam-jacketed copper pan, add the arsenious acid and boil until it is dissolved and keep at the boil.

Dissolve the sulphate of copper in 60 gallons of boiling water in another copper. Mix the two boiling solutions by running them simultaneously into a vat. Cool to about 180° F., add the acetic acid, but do not stir, and the moment the first sign of a bluish-green crystal appears, on drawing up the wooden pole used as a stirrer, deluge the batch with an equal bulk of cold water, and let stand for three days without touching. Wash well, run off the dirty green liquor from the real pigment, throw on a filter, drain, and dry in the stove room; sift in the lee of a draught, and pack into casks for sale or for repacking into pound or half-pound packets.

Emerald Green.

	Cwt.	Qr.	Lb.
Copper sulphate	2	1	0
Caustic soda	0	1	0
White arsenic	1	3	14
Acetate of soda	0	2	0
Barytes	0	1	14

Dissolve copper sulphate in the top vat with 100 gallons of water; in the bottom vat put caustic soda and dissolve in water; in the centre vat put arsenic and boil for twenty minutes. Then run in the caustic soda, boiling up for fifteen minutes to dissolve the arsenic; then add acetate of soda, boil up again for ten minutes, and run in copper solution as soon as possible. Then cover up tight until next day. The barytes is put in along with the arsenic.

Fine Emerald Green.

	Cwt.	Qr.	Lb.
White arsenic	2	2	10
Copper sulphate	4	0	0
Carbonate of soda	4	0	0
Acetic acid	0	3	20

Dissolve arsenic and soda together in bottom vat, then boil up well for fifteen minutes. Have copper sulphate dissolved in top vat, then run it into bottom vat, stir gently and add the acetic acid gradually; fill up vat with cold water after standing one hour, then allow to stand until the colour forms properly.

Emerald Green Pure.

	Cwt.	Qr.	Lb.
Sulphate of copper	1	2	0
Caustic soda	0	1	7
White arsenic	1	3	14
Acetate of soda	1	2	8

For process, see above.

Super Emerald Green.

	Cwt.	Qr.	Lb.
Sulphate of copper	1	2	0
Caustic soda	0	1	0
Acetate of soda	1	0	7
White arsenic	1	1	0
Produce	1	2	0

For process, see above.

Mineral Green.

	Cwt.	Qr.	Lb.
Sulphate of copper	1	1	0
Caustic soda	0	1	7
White arsenic	0	0	7
Tartaric acid	0	0	6

Process.—Same as for Emerald, add tartaric acid when Emerald green is cold.

Royal Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	24
Sulphate of iron	0	0	24
Bichromate of potash	0	0	6
Sulphuric acid	0	0	12
Nitric acid	0	0	4
Nitrate of lead	1	1	14
Carbonate of lead	0	1	14
Bichromate of potash	0	1	12
Sulphuric acid	0	1	14

Deep Royal Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	3	0
Sulphate of iron	0	3	0
Chlorate of potash	0	0	7½
Sulphuric acid	0	1	10
Nitrate of lead	1	1	14
Carbonate of lead	0	1	0
Bichromate of potash	0	1	12
Sulphuric acid	0	1	14

Engine Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	3	0
Sulphate of iron	0	3	0
Bichromate of potash	0	0	12
Sulphuric acid	0	0	21
Nitrate of lead	1	1	0
Carbonate of lead	1	0	0
Bichromate of potash	0	2	20
Sulphuric acid	0	2	4

Pale Royal Green Pure.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	18
Sulphate of iron	0	0	18
Bichromate of potash	0	0	4
Sulphuric acid	0	0	9
Nitric acid	0	0	4
Nitrate of lead	1	1	0

	Cwt.	Qr.	Lb.
Carbonate of lead	0	2	0
Bichromate of potash	0	1	18
Sulphuric acid	0	1	20

Royal Green.

	Cwt.	Qr	Lb.
Prussiate of Potash	0	0	18
Sulphate of iron	0	0	18
Bichromate of potash	0	0	4
Sulphuric acid	0	0	4
Nitric acid	0	0	$2\frac{1}{2}$
Nitrate of lead	1	1	0
Carbonate of lead	0	2	0
Bichromate of potash	0	1	18
Sulphuric acid	0	1	20
White barytes	2	0	0
Terra alba	2	0	0

Process of making these Royal Greens same as for Brunswick Greens given above.

Lime Green.

	Cwt.	Qr.	Lb.
Sulphate of copper	2	0	0
Caustic soda	0	1	0
White arsenic	0	0	12

Dissolve copper salt in top vat; in the bottom vat dissolve the arsenic. Then run into copper solution, boil up for twenty miuutes, and run in the slaked lime. The top liquor is clear in half an hour from striking; the colour is thoroughly precipitated. No washing is required.

Rich Pale Green for Litho. or Letterpress Ink.

	Cwt.	Qr.	Lb.
S. R. Chrome	1	0	0
Chinese blue	0	0	7

Run under edge-runners for thirty minutes.

Rich Mid Green for Letter or Litho. Ink.

	Cwt.	Qr.	Lb.
S. R. Chrome	1	0	0
Chinese blue	0	0	10

Rich Pale Green For Floorcloth.

	Cwt.	Qr.	Lb.
S. R. Chrome	1	0	0
Chinese blue	0	0	7
Barytes	0	0	14
Paris white	0	2	14

Deep Rich Green.

	Cwt.	Qr.	Lb.
Chinese blue	0	0	15
S. R. Chrome	0	3	0
Paris white	1	0	0
Barytes white	1	0	0

Run under edge-runners about forty-five minutes.

Deep Rich Green.

	Cwt.	Qr.	Lb.
Chinese blue	0	0	15
S. R. Chrome	0	3	0
Paris white	2	0	0
Barytes	2	0	0

Light Ochre Green No. 1.

	Qr.	Lb.
China blue	0	15
S. R. Chrome	3	0
Sardinia ochre	3	0

Dark Ochre Green.

	Qr.	Lb.
Chinese blue	0	20
S. R. Chrome	3	0
Sardinia ochre	3	0
Vegetable black	0	7

Emerald Tint Green Pure.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	1	0
Sulphate of iron	0	1	0
Chlorate of potash	0	0	7
Sulphuric acid	0	0	24
Nitrate of lead	1	0	0
Carbonate of lead	1	3	0

	Cwt.	Qr.	Lb.
Bichromate of potash	0	3	4
Sulphuric acid	0	0	21
Soda sulphate	0	0	14

Emerald Tint Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	1	0
Sulphate of iron	0	1	0
Chlorate of potash	0	0	7
Sulphuric acid	0	0	4
Nitrate of lead	1	0	0
Carbonate of lead	1	3	0
Bichromate of potash	0	3	4
Sulphuric acid	0	0	1
Soda sulphate	0	0	10
For A No. 1 add Barytes best . .	6	2	0
For A No. 2 add Barytes best . .	10	0	0

Pale Emerald Tint Green.

	Cwt.	Qr.	Lb.
Prussiate of potash	0	0	14
Sulphate of iron	0	0	14
Chlorate of potassium	0	0	3½
Sulphuric acid	0	0	12
Nitrate of lead	1	0	0
Carbonate of lead	1	3	0
Bichromate of potash	0	3	4
Sulphuric acid	0	0	21
Soda crystals	0	1	0
Carbonate of soda	2	3	0

Process of making these Emerald Tint Greens same as for Brunswick Greens given above.

Japanner's Green.

	Cwt.
Mineral green	5
China clay	1½

Grind up in "copal varnish" thinned with turps.

Green Lake.

100 lb. of barytes, 5 lb. of Naphthol green B, 40 lb. of lead acetate, the addition of a little ammonia completes the precipitation; the lake obtained is of an olive-green shade.

Yellow-Green Lake.

100 lb. of barytes, 1 lb. of Brilliant green, and 1 lb. of picric acid. The barytes and green are diffused through water as usual, and when ready the picric acid (previously dissolved in water) is run in ; the lake precipitated is finished as usual.

Blue-Green Lake.

100 lb. of barytes, 1 lb. of Brilliant green, 1 lb. of tartar emetic' and 1½ lb. of tannic acid. This gives a very deep bluish-green lake. Mix the barytes, Brilliant green and tartar emetic with boiling water and add the tannic acid.

Yellow-Green Lake.

100 lb. of barytes, 1 lb. of Brilliant green, ½ lb. of Auramine, 1½ lb. of tartar emetic, and 2½ lb. of tannic acid. This gives a very nice yellow-green lake; by varying the proportions of the two dye-stuffs a great variety of green lakes can be made, and also a very good imitation of emerald green may be obtained by their means.

Satin White.

It is prepared by slaking quicklime (16 lb.) with water to a thick cream, dissolving alumina sulphate (34 lb.) in water, heating the two and then mixing them, allowing the mixture to stand for a few hours, then filtering, washing, and drying the precipitate or residue. Care must be taken to employ a good quality of lime, which should be free from grit and much insoluble matter, hence chalk lime is better than limestone lime.

Satin White.

Take 118 lb. of freshly slaked lime, adding to this 350 lb. of alumina sulphate and 10 lb. of alum ; the mixture is then worked in a pug mill with as much water as will make a thin paste, the ingredients being kept mixed for an hour or so, the pigment is then filtered, washed and dried.

White Lead Substitute.

G. de Velna and C. Folie-Desjardins de Cool propose to make a white lead substitute by mixing together equal quantities of saturated solutions of alum and carbonate of soda, which will produce a white,

gelatinous precipitate of aluminium carbonate of buttery consistence. After filtration, the jelly is mixed, in the proportions of two-thirds or more, with finely powdered carbonate of lime, magnesia, or other analogous, non-poisonous white powder, the product being rendered homogeneous by prolonged trituration, and then dried in thin layers, with or without moderate heat. The dried product is finely ground and mixed with linseed or poppy oil to the consistence of white lead. Like the latter, it can be stored for a long time under water, and can be made up into paint with colouring matters and driers. The paint dries with a gloss that does not need varnishing.

Black Lake.

100 lb. of barytes, 10 lb. of Naphthol black B, 15 lb. of barium chloride. This gives a rather grey shade of black.

Black Lake.

Mix 100 lb. barytes with 10 lb. Diamine jet black S S, and add a solution of 20 lb. barium chloride.

Brown Lake.

100 lb. of barytes, 10 lb. of Cotton brown A, 20 lb. of barium chloride. The barytes and Cotton brown are diffused through sufficient water, and the barium chloride, previously dissolved in water, added.

Brown Lake.

100 lb. of barytes, 2 lb. of Bismarck brown, 2 lb. of tartar emetic, and 4 lb. of tannic acid. Mix the barytes, Bismarck brown and tartar emetic in boiling water, and add the tannic acid, previously dissolved in water.

Violet Lake.

62 lb. of Glauber s salt, 2 lb. of Acid violet 3 B, 72 lb. of barium chloride. The first two are dissolved together, then the last added being previously dissolved in water.

Violet Lake.

100 lb. of barytes, 3 lb. of Acid violet 9 B, 10 lb. of barium chloride. This gives a blue shade of violet lake.

Violet Lake.

100 lb. of barytes, 1 lb. of Methyl violet, 1 lb. of tartar emetic, and 1½ lb. of tannic acid. The shade of this lake will depend entirely upon the shade of the violet used, which may vary from a violet red (Violet 3 R) to a pure violet (Violet 5 B). Either Methyl violet, or Hoffmann's violet, or Paris violet may be used.

Violet Lake.

A violet lake can be made by adding 2½ gallons of antimony chloride at 52° Tw. to each 16 gallons of a decoction of logwood at 10° Tw. The lake is immediately precipitated, and is filtered, washed and dried.

Violet Lake.

Mix 100 lb barytes with 4 lb. Formyl violet S 4 B, and add 10 lb. of barium chloride, previously dissolved in water.

The following books will be found to contain much valuable information on the preparation of pigment colours:—

The Manufacture of Mineral and Lake Pigments. By Dr. Josef Bersch. Price 12s. 6d. net. Scott, Greenwood & Son. Contains descriptions of the processes of making all pigments and of the materials used for this work.

A Dictionary of Chemicals and Raw Products Used in the Manufacture of Paints. By George H. Hurst, F.C.S. Price 7s. 6d. net. Scott, Greenwood & Son. Contains excellent accounts of the properties of pigments, chemicals, etc., used in paint and varnish making and in painting and decorating.

The Manufacture of Lake Pigments from Artificial Colours. By Francis H. Jennison, F.I.C., F.C.S. Price 7s. 6d. net. Scott, Greenwood & Son. Describes the use of coal-tar colours and dyes for making lake pigments.

The Chemistry of Pigments. By E. J. Parry, B.Sc., F.I.C., F.C.S., and John H. Coste, F.I.C., F.C.S. Price 10s. 6d. net. Scott, Greenwood & Son.

The Manufacture of Paint. By J. Cruickshank Smith, B.Sc. Price 7s. 6d. net. Scott, Greenwood & Son.

Oil Colours and Printing Inks. By L. E. Andés. Price 5s. net. Scott, Greenwood & Son.

SECTION II.

MIXED PAINTS, PAINT REMOVERS, AND PREPARATIONS FOR PAINT MAKING, PAINTING, LIMEWASHING, PAPERHANGING, ETC.

Genuine White Zinc.

	Cwt.	Qr.
Red seal zinc white	10	2
Refined linseed oil	17½ gallons.	

Zinc White No. 1.

	Cwt.	Qr.
Red seal zinc	4	2
White barytes	1	2
Refined linseed oil	9½ gallons.	

Zinc White No. 2.

	Cwt.	Qr.	Lb.
Red seal zinc white	4	2	0
White barytes	1	3	14
China clay	0	0	14
Refined oil	10 gallons.		

Export Zinc No. 1.

	Cwt.	Qr.	Lb.
Red seal zinc oxide	4	2	0
No. 1 white barytes	1	2	0
China clay	0	2	14
Refined linseed oil	12½ gallons.		

Export Zinc No. 2.

	Cwt.	Qr.	Lb.
Red seal zinc oxide	4	2	0
No. 1 white barytes	1	3	14
China clay	0	2	14
Refined linseed oil	13 gallons.		

Export Zinc No. 3.

	Cwt.	Qr.	Lb.
Red seal zinc oxide	2	2	14
No. 1 white barytes	2	1	0
China clay	0	2	14
Refined linseed oil	$8\frac{1}{2}$ gallons.		

Export Zinc No. 4.

	Cwt.	Qr.
Zinc oxide red seal	3	0
Zinc sulphide	0	2
White barytes	3	2
China clay	2	0
Refined linseed oil	13 gallons.	

Zinc White, Common, No. 1.

	Cwt.	Qr.	Lb
Zinc oxide red seal	1	2	0
Zinc sulphide	0	2	0
White barytes	4	0	0
China clay	0	0	14
Refined oil	$8\frac{1}{2}$ gallons.		

Ships' Stores Zinc White.

	Cwt.	Qr.	Lb.
Zinc oxide	1	2	0
Zinc sulphide	0	2	0
China clay	0	0	14
White barytes	6	0	0
Refined oil	12 gallons.		

Common Zinc White.

	Cwt.
Zinc oxide	1
Zinc sulphide	1
China clay	1
White barytes	7
Refined oil	14 gallons.

Genuine White Lead.

English white lead	5 cwt.
Refined linseed oil	5 gallons.

No. 1 White Lead.

	Cwt.
English white lead	5
White barytes	1
Refined linseed oil	5½ gallons.

No. 2 White Lead.

	Cwt	Qr.
English white lead	5	0
White barytes	2	2
Refined linseed oil	6½ gallons.	

Common Lead.

	Cwt.
Foreign white lead	5
White barytes	5
Refined linseed oil	7½ gallons.

Common Lead Export No. 1.

	Cwt.
Foreign white lead	5
White barytes	5
Refined linseed oil	7½ gallons.

Export White Lead No. 2.

	Cwt.	Qr.
Foreign white lead	5	0
White barytes	7	2
Refined linseed oil	9½ gallons.	

Export White Lead No. 3.

	Cwt.	Qr.
Foreign white lead	2	2
White barytes	7	2
Refined linseed oil	7 gallons.	

Jointing White Lead No. 1.

	Cwt.
White barytes	1
English white lead	1
Refined linseed oil	10 gallons.

Jointing White Lead No. 2.

	Cwt.	Qr.
White barytes	9	2
English white lead	0	2
Refined linseed oil	8½ gallons.	

Jointing White Lead No. 3.

	Cwt.	Qr.	Lb.
White barytes	9	3	0
English white lead	0	1	14
Refined linseed oil	8½ gallons.		

Brunswick Blue.

	Cwt.
Brunswick blue	4
Paris white	3
White barytes	3
Raw linseed oil	13½ gallons.

Brunswick Blue.

	Cwt.
Brunswick blue	4
Paris white	2
White barytes	1
Raw linseed oil	9½ gallons.

Brunswick Blue No. 2.

	Cwt.	Qr.
Brunswick blue	4	0
Paris white	2	2
White barytes	2	0
Raw linseed oil	11½ gallons.	

Export Blue.

	Cwt.
Brunswick blue	1
Barytes	2
Paris white	2
Paint oil	11 gallons.

Export Blue No. 3.

	Cwt.
Brunswick blue	1
Barytes	3
Paris white	3
Paint oil	12½ gallons.

Export Blue No. 4.

	Cwt.
Brunswick blue	1
Barytes	4
Paris white	4
Paint oil	13½ gallons.

Brunswick Green, Light.

	Cwt.
Light Brunswick green	4
White barytes	1
Paris white	1
Raw linseed oil	7¾ gallons.

Light Brunswick Green No. 2.

	Cwt.	Qr.
Light Brunswick green	4	0
White barytes	2	0
Paris white	1	2
Raw linseed oil	9 gallons.	

Light Brunswick Green No. 3.

	Cwt.
Light Brunswick green	4
White barytes	1
Paris white	3
Raw linseed oil	12 gallons.

Light Brunswick Green No. 4.

	Cwt.
Light Brunswick green	4
White barytes	1
Paris white	5
Raw linseed oil	15 gallons.

Deep Brunswick Green.

	Cwt.
Deep Brunswick green	4
Paris white	1
French chalk	1
Raw linseed oil	7¾ gallons.

Deep Brunswick Green No. 2.

	Cwt.
Deep Brunswick green	4
Paris white	2
French chalk	2
Raw linseed oil	10 gallons.

Deep Brunswick Green No. 3.

	Cwt.
Deep Brunswick green	4
Paris white	3
French chalk	3
Raw linseed oil	14 gallons.

Export Green.

	Cwt.
Brunswick green dry	1
Grey barytes	4
Paris white	1
Paint oil No. 2	7½ gallons.

Export Green No. 2.

	Cwt.	Qr.
Brunswick green dry	1	0
Grey barytes	4	2
Paris white	1	2
Paint oil No. 2	8 gallons.	

Export Green No. 3.

	Cwt.
Brunswick green dry	1
Grey barytes	5
Paris white	3
Paint oil No. 2	10 gallons.

Export Green No. 4.

	Cwt.	Qr.
Brunswick green dry	1	0
Grey barytes	5	2
Paris white	5	0
Paint oil No 2	11½ gallons.	

Fine Siennas in Oil.

	Cwt.	Qr.
Raw sienna	1	2
French chalk	0	3
Paris white	0	3
Raw linseed oil	12 gallons.	
Boiled oil	1½ gallons.	

Super Siennas Raw in Oil.

	Cwt.	Qr.
Raw sienna	1	0
French chalk	0	1
Paris white	0	1
Raw linseed oil	6 gallons.	
Boiled oil	1 gallon.	

Raw Siennas in Oil, Ordinary.

	Cwt.	Qr.
Raw sienna	1	0
French chalk	2	0
Paris white	0	3
Raw linseed oil	12 gallons.	
Boiled oil	5 gallons.	

Ochre No. 1.

	Cwt.
Italian ochre	4
Grey barytes	1
Paris white	1
Raw linseed oil	10½ gallons.

Ochre No. 2.

	Cwt.
Italian ochre	4
Grey barytes	2
Paris white	1
Raw linseed oil	12 gallons.

Ochre No. 3.

	Cwt.	Qr.
Italian ochre	4	0
Grey barytes	2	2
Paris white	2	2
Raw linseed oil	13½ gallons.	

Ochre No. 4.

	Cwt.
Italian ochre	4
Grey barytes	3
Paris white	3
Raw linseed oil	15 gallons.

Bright Ochre.

	Cwt.	Qr.
Italian ochre	4	0
Middle chrome	0	2
Paris white	1	0
White barytes	1	0
Raw linseed oil	11½ gallons.	

Bright Ochre No. 2.

	Cwt.	Qr.
Italian ochre	4	0
Paris white	1	0
White barytes	1	0
Middle chrome	0	2
Raw linseed oil	11½ gallons.	

Bright Ochre No. 3.

	Cwt.	Qr.
Italian ochre	4	0
Middle chrome	0	2
Paris white	2	2
White barytes	2	2
Raw linseed oil	15¼ gallons.	

Export Ochre No. 1.

	Cwt.
Italian ochre	1
Grey barytes	2
Paris white	2
Paint oil No. 2	8 gallons.

Export Ochre No. 2.

	Cwt.
Italian ochre	1
Grey barytes	4
Paris white	4
Paint oil No. 2	12 gallons.

Export Ochre No. 3.

	Cwt.
Italian ochre	1
Grey barytes	5
Paris white	5
Paint oil No. 2	15½ gallons.

Export Ochre No. 4.

	Cwt.
Italian ochre	1
Grey barytes	7
Paris white	7
Paint oil No. 2	19 gallons.

Red Oxide.

	Cwt.	Qr.
Red oxide	3	0
Grey barytes	0	2
Paris white	0	2
Linseed oil	6½ gallons.	

Red Oxide No. 1.

	Cwt.
Red oxide	3
Grey barytes	2
Paris white	2
Linseed oil	12½ gallons.

Red Oxide No 2.

	Cwt.
Red oxide	3
Grey barytes	1
Paris white	1
Linseed oil	8½ gallons.

Red Oxide No. 3.

	Cwt.	Qr.	Lb.
Grey barytes	4	0	0
Common Venetian red	1	0	0
Red oxide	0	0	20
Paint oil No. 1	6½ gallons.		

Export Red Oxide No. 4.

	Cwt.	Qr.	Lb.
Grey barytes	4	0	0
Common Venetian red	0	2	0
Red oxide	0	0	20
Paint oil No. 1	6½ gallons.		

Export Red Oxide.

	Cwt.	Qr.	Lb.
Grey barytes	4	0	0
Common Venetian red	0	1	0
Red oxide	0	0	20
Paint oil No. 1	5½ gallons.		

Indian Red.

	Cwt.
Dry Indian red	4
Paris white	1
White barytes	1
Raw linseed oil	9 gallons.

Indian Red No. 2.

	Cwt.
Dry Indian red	4
Paris white	2
White barytes	2
Raw linseed oil	11½ gallons.

Indian Red No. 3.

	Cwt.	Qr.
Dry Indian red	4	0
Paris white	2	0
White barytes	2	2
Raw linseed oil	12 gallons.	

Export Indian Red.

	Cwt.	Qr.
Dry Indian red	4	0
Grey barytes	2	2
Paris white	4	0
Paint oil No. 1	14½ gallons.	

Export Indian Red No. 2.

	Cwt.
Dry Indian red	4
Grey barytes	3
Paris white	5
Paint oil No. 1	17½ gallons.

Export Indian Red No. 3.

	Cwt.	Qr.
Dry Indian red	4	0
Grey barytes	2	2
Paris white	2	2
Paint oil No. 1	13½ gallons.	

Export Indian Red No. 4.

	Cwt
Dry Indian red	1
Grey barytes	3
Paris white	5
Paint oil No. 1	16½ gallons.

Blacks in Turps.—Superior Black in Turps.

	Cwt.	Qr.
Carbon black	1	0
Barytes	0	1
China clay	0	1
Turps	10½ gallons.	
Boiled oil	1 gallon.	

Fine Black in Turps.

	Cwt.	Qr.
Carbon black	1	0
Barytes	0	2
China clay	0	1
Turps	10½ gallons.	
Boiled oil	1½ gallons.	

Blacks, Ordinary.

	Cwt.
Carbon black	1
Barytes	1
China clay	1
Turps	17 gallons.
Boiled oil	2 gallons.

Black, Superior Fine.

	Cwt.	Qr.
Carbon black	1	0
White barytes	1	2
Paris white	1	2
Boiled linseed oil	7½ gallons.	

Fine Black No. 2.

	Cwt.	Qr.
Carbon black	1	0
White barytes	2	2
Paris white	2	2
Boiled linseed oil	10½ gallons.	

Black No. 1.

	Cwt.	Qr.
Carbon black	1	0
White barytes	2	2
Paris white	2	2
Boiled linseed oil	10½ gallons.	

Black No. 2.

	Cwt.
Carbon black	1
White barytes	3
Paris white	4
Boiled linseed oil	13½ gallons.

Ordinary Black.

	Cwt.	Qr.
Vegetable black	1	0
Carbon black	0	1
Paris white	2	0
White barytes	1	0
Boiled oil	8½ gallons.	

Ordinary Black No. 2.

	Cwt.	Qr.
Vegetable black	1	0
Carbon black	0	1
Paris white	3	0
White barytes	2	0
Boiled oil	11 gallons.	

Ordinary Black No. 3.

	Cwt.	Qr.
Vegetable black	1	0
Paris white	3	2
Carbon black	0	2
White barytes	2	2
Boiled oil	13 gallons.	

Ordinary Black No. 4.

	Cwt.	Qr.
Vegetable black	1	0
Carbon black	0	1
Paris white	3	2
White barytes	2	2
Boiled oil	14½ gallons.	

Export Black No. 1.

	Cwt.	Qr.	Lb.
Vegetable black	1	0	0
Paris white	2	0	0
Carbon black	0	0	14
Barytes	2	2	14
Paint oil	9¼ gallons.		

Export Black No. 2.

	Cwt.	Qr.	Lb.
Vegetable black	1	0	0
Paris white	2	2	0
Carbon black	0	0	14
Barytes	3	2	14
Paint oil	11½ gallons.		

Export Black No. 3.

	Cwt.	Qr.	Lb.
Vegetable black	1	0	0
Paris white	3	0	0
Carbon black	0	0	14
Barytes	5	0	0
Paint oil	14 gallons.		

Ordinary Black No. 4.

	Cwt.	Qr.
Vegetable black	1	0
Carbon black	0	1
Paris white	4	2
White barytes	3	2
Boiled oil	16 gallons.	

Export Black No. 5.

	Cwt.	Qr.	Lb.
Vegetable black	1	0	0
Paris white	4	0	0
Carbon black	0	0	14
Barytes	7	0	0
Paint oil	17 gallons.		

Export Black No. 6.

	Cwt.	Qr.	Lb.
Vegetable black	1	0	0
Paris white	5	0	0
Carbon black	0	0	14
Barytes	8	0	0
Paint oil	18½ gallons.		

All the above are for the stiff pulp colours sent out for painters' use, and only require thinning down with oil and turps to be converted into paint.

Anticorrosive Paint.

According to Liebreich, whilst the addition of alkali to oil paint will preserve iron from rusting, this property is lost when the paint is exposed to the action of water, the latter diluting the alkali and causing the metal to rust. The difficulty may, however, be overcome by the use of an alkali compound, preferable solid, that forms free alkali only after contact with water, thus rendering the latter innocuous to the metal. It is important that paints prepared by this way should be kept from contact with water or moisture until used. Among the alkaline substances mentioned as suitable are, potassium sulphide, sodium sulphide, potassium or sodium amalgams, potassium amide, and the cyanamides of potassium, sodium and calcium. The best results are obtained by employing these paints as a priming, and then topping them with a coat of paint that does not contain any saponifiable substances, in order to keep the first coating from contact with water as much as possible. A grey paint of this kind may be prepared by mixing 23 parts by weight of white lead with 6 parts of boiled linseed oil and a little Frankfurt black, about 5¾ per cent. of perfectly dry potassium sulphide being stirred into the cold paint. The second coating consists of the same paint without the addition of potassium sulphide.

Antifouling Composition.

	Parts.
Resinate of copper	2
Zinc oxide	1
Boiled oil	1
Gasoline	1
Rosin	1
Naphtha	2½
	8½

Dissolve the rosin in the naphtha in the cold, add the resinate of copper, stir until dissolved, using a very gentle heat if need be; add the boiled oil and thin down with the gasoline, then stir in the zinc oxide. Resinate of copper is made in the same way as resinate of manganese, only using sulphate of copper instead of the sulphate of manganese, into which to pour the rosin soap.

Antifouling Paint.

This mixture adheres well to the vessels, and is very effectual in resisting the formation of fouling growths.

	Cwt	Qr.	Lb.
Ground rosin	1	0	0
Self-colour pigment	0	0	15
Ground alum	0	0.	4
Thick boiled oil or cheap varnish . .	10 gallons.		
Shale naphtha	2 gallons.		

Boil the rosin in the oil or varnish, cool, stir in the alum, then grind with the required colour pigment (Indian or Venetian red, Brunswick greens, etc., etc.). Afterwards thin with the naphtha, and finally run into drums, sealing at once

Antifouling Paint.

These compositions are all applied in three separate forms, priming, second coat, and finishing. Thus, for priming, make a varnish of 7 lb. rosin to each gallon of mineral naphtha, dissolved by shaking. One cwt. of red oxide of iron (reduced with 28 lb. Paris white, if desired) is now mixed with 1 gallon of boiled oil, and enough of the above varnish to make it easily workable. For the second coat 1 cwt. of best French verdigris is spread on a large tray, and 1 gallon 75 per cent. carbolic acid sprinkled over it. Now stir it about until it is black. Let it stand twenty-four hours to dry; then mix with ½ cwt. of red oxide of iron, 7 lb. of red oxide of mercury, 2 gallons of boiled oil, 1 gallon of japan varnish, and enough rosin varnish to thin for use. Finish with a mixture as follows: (1) 2½ lb. shellac dissolved in one gallon of wood naphtha or methylated spirit, and 1 pint of rosin varnish added; (2) melt over a fire 1 lb. rosin; ¾ lb. of Burgundy pitch, and ½ lb. of tallow; allow this to cool a little, and then pour in 1 quart of boiled oil and 1 pint of tar spirit. Now add to the shellac varnish and mix thoroughly. The iron oxide as follows may be added gradually until perfectly homogeneous: 7½ lb. of iron oxide and 1¼ lb. of arsenic. In some cases, as for vessels going East, particularly to the China waters, a quantity of red oxide of mercury is put in to destroy animalculæ. To above quantities is added ¼ lb. to 1 lb. of red oxide of mercury.

Green Antifouling Paint for Yachts.

	Cwt.	Qr.	Lb.
Mineral green	0	1	21
Rosin	2	3	12
Zinc white	1	2	0
Mineral naphtha	22 gallons.		

Funnel Paint for Yachts.

	Cwt.	Qr.	Lb.
Zinc white	3	0	0
Terra alba	0	0	14
Oxford ochre	0	2	0
Gold size	5 gallons.		
Turps	8 gallons.		

Cream Colour for Yachts.

	Cwt.	Qr.	Lb.
Zinc white	3	0	0
Terra alba	0	0	14
Red oxide	0	0	½
Oxford ochre	0	0	14
Gold size	5 gallons.		
Turps	8 gallons.		

First Coating for Green.

	Cwt.	Qr.	Lb.
Mineral green	0	1	21
Rosin	2	0	0
Zinc white	1	2	0
Naphtha	22 gallons.		

Red Composition.

	Cwt.	Qr.	Lb.
Rosin, best medium	2	3	12
Red oxide	0	2	0
Zinc white	1	2	0
Naphtha, mineral	23 gallons.		

Copper Colour.

	Cwt.	Qr.	Lb.
Best French rosin	2	3	12
Red oxide	0	2	0
Mineral green	0	0	14
Zinc white	1	2	7
Naphtha	33 gallons.		

Paint for Motor-car Silencers.

The silencer and exhaust piping of a motor-car can be painted with a paint made as follows: Boiled linseed oil $\frac{1}{5}$ lb., japan varnish $\frac{1}{5}$ lb.; spirits of turpentine $\frac{2}{5}$ lb.; lampblack $1\frac{1}{2}$ oz.; pure powdered graphite, $1\frac{1}{2}$ oz.; powdered oxide of manganese $\frac{3}{8}$ oz. First mix the linseed oil and japan varnish well together, then add in the order named and stirring all the time, the lampblack, graphite, and powdered manganese. The solids should be added slowly while the stirring is briskly maintained. As the mixture thickens, thin it down with turpentine, until the quantity mentioned is added. This paint should be used at once, for it dries rapidly and every time the brush is dipped the mixture should be carefully stirred. It is well to paint the silencers while they are hot, first cleaning them thoroughly.

Blackboard Paint.

	Lb.
Shellac	16
Lampblack	16
Prussian blue	1
Fine emery	8
Drier	20
Methylated spirit	140
Raw linseed oil	1 gallon.

Method.—Dissolve the shellac in the spirits; grind the other constituents well together, and then mix in thoroughly with the solution.

Paint for Floors.

For flooring, the following mixture has been found applicable: $2\frac{1}{4}$ oz. of good clear joiners' glue is soaked overnight in cold water; the next day it is dissolved by heat, and is then added (being constantly stirred) to thickish milk of lime heated to boiling-point, and prepared from 1 lb. of quicklime. Into this boiling lime (the stirring being continued) is poured as much linseed oil as becomes united by means of saponification with the lime, and when the oil no longer mixes there is no more poured in. If there happens to be too much oil added, it must be combined by the addition of some fresh lime paste. For the quantity of lime previously indicated, about half a pound of oil is required. After this white thickish foundation paint has cooled, a colour is added which is not affected by lime, and in

case of need, the paint is diluted with water, or by the addition of a mixture of limewater with some linseed oil.

For yellowish brown or brownish red shades, about a fourth part of the entire bulk is added of a brown solution obtained by boiling shellac and borax with water. This mixture is specially adapted for painting floors. The paint should be applied uniformly, and will cover the floor most effectually, and unite with it in a durable manner. But it is to be remarked that it is not suitable for being used in cases where a room is in constant use, as under such circumstances it will probably have to be renewed in some places every three months. The most durable floor paint is composed of linseed oil varnish, which only requires to be renewed every six or twelve months. It penetrates into the wood and makes it water-resisting, its properties being thus of a nature to compensate for its higher cost in proportion to other compositions used for a similar purpose. Its use is particularly recommended in schools and workrooms, as it lessens dust and facilitates the cleaning of the boards.

Black Paint.

	Lb.
Boiled oil	18
Carbon black	25
Raw linseed oil	18
Barytes	112
White lead	56

Grind all together. This is thinned down with boiled oil and turpentine to make into a working paint.

Blue Paint.

Mix 136 lb. of Celestial blue, 96 lb. of barytes, 28 lb. of raw linseed oil, 28 lb. of boiled linseed oil, and turps as required.

Paint for Metals.

10 parts of finest powdered stick sulphur is dissolved, with the application of heat, in 90 parts of oil of turpentine and mixed with 50 parts of linseed oil varnish. This very firmly adhering paint can be coloured black by the addition of lampblack, or brownish-red by the addition of English red, and white by means of zinc white.

Paint for Inscriptions on Metal.

Whereas oil paints tend to peel off when applied to sheet metal, Doering states that paints, compounded with water-glass will adhere permanently (and also on glass), the silicate forming white crystals. These paints are prepared in the same manner as distemper or casein paints, diluted water-glass being stirred in with a colour paste. The paint should never be applied to a surface that is already covered with oil paint, sodium silicate being used as a paint remover. The paint should be used the same day as prepared, since it begins to thicken by the second day, and is no longer workable. Compounds of lime, lead, copper or mercury must not be mixed with water-glass, as the mass is rendered as hard as stone immediately, and can no longer be thinned down or used.

Bronze-Green Iron Paint.

Ivory black 1 oz., chrome yellow 1 oz., chrome green 2 lb., mix with raw linseed oil, adding a little japan to dry it, and a nice bronze-green paint is made. If desired, gold bronze may be put on the prominent parts, as on the tips or edges of iron railings. When the paint is not quite dry, use a piece of velvet or plush with which to rub on the bronze. With statuary, plaster casts, or castings, wash the plaster over with thin glue or starch water, when dry apply the bronze mixture above described, adding to it a little gold bronze powder or some Dutch metal, powdered on the stone.

Bronze Paint.

	Oz.	Dr.
Verdigris	8	0
Putty powder	4	0
Borax	2	0
Nitre	2	0
Corrosive sublimate	0	2

Make into a paste with oil, then tone down with boiled oil and turps.

Bronze Paint No. 2.

Boiling water sufficient to dissolve; copper sulphate, 4 oz. Put 4 oz. of iron nails into the hot solution, and collect the precipitated copper. Dry it, and rub down very fine with boiled oil and turps.

Bronze Paint No. 3.

	Oz.
Sulphur	2
Stannic acid	2

Melt together in a crucible. Stir when melted with the stem of a tobacco-pipe until it assumes the appearance of golden spangles, then pour out. Mix this when cold with boiled oil, turps, and add a little driers. These cheap bronzes should all be coated over with a clear varnish when dry or they will soon tarnish in rooms where gas is used.

Bronze Paint.

	Lb.	Oz.
Chrome green	2	0
Ivory black	0	1
Chrome yellow	0	1
Japan varnish	0	5
Linseed oil	*q.s.*	

Dark Brown Paint.

Mix up 65 lb. of English umber, 54 lb. of barytes, 28 lb. of raw linseed oil, 28 lb. of boiled linseed oil, and turps as required.

Light Brown Paint.

Mix 7 lb. of Turkey red, 56 lb. of English umber, 56 lb. of barytes, 28 lb. of raw linseed oil, 28 lb. of boiled linseed oil, and turps as required.

Buff Paint.

	Cwt.
White lead	3
Grey barytes	5
Red oxide (genuine)	8
J. F. L. S. ochre	100
Burnt Turkey umber	8

Grind in raw linseed oil.

Paint for Drums.

Dissolve rosin in an equal bulk of naphtha, and colour with lamp-black for black, Celestial blue for blue, Venetian red for red, and so on. A little boiled oil will help it to give a good adherent paint.

Heat-Resisting and Fire-proof Paints.

Roman Prasser's Recipe.—Equal parts (40) of pigment and spirit varnish (compounded of 1 part of bleached shellac in 7 parts of spirit) are intimately mixed with 1 part of camphor and 5 parts of bleached oil varnish. The article to be coated is brushed over several times with a mixture of gypsum and spirit varnish, flatted and painted over with the above preparation, being finally polished lightly with shellac varnish. This paint will stand the heat of boiling water for some time, but browns on prolonged exposure and peels off.

O. M. Meissl's Recipe.—Solid fats or fatty acids are distilled at 250° to 300° C. with superheated steam, the residue being mixed with about 10 per cent. of red lead and 2 per cent. of litharge, treated with superheated steam at 400° to 500° C. (?) and thinned down at 150° to 200° C. to workable consistency with linseed oil. As an alternative method the dilution with linseed oil is replaced by blowing in 25 per cent. of petroleum vapour, and then diluting with crude benzol, or other diluent, when sufficiently cool. The product is said to dry with a glossy surface, and stand a dry heat of 500° C. or a damp heat up to 250° C. As a matter of fact, all asphaltic substances, and especially the distillation of residues from fats (bone pitch, etc.), are capable of resisting high temperatures, and are used for stoving enamels.

Meyer's Recipe.—Residues from the distillation of fatty acids are heated to about 500° C., with lead oxide and lead peroxide for three to four hours until thoroughly combined, the mass being dissolved in mineral oil and thinned down with turps.

Bethisy's Recipe.—The mass consists of nitro-cellulose and a solution of calcium chloride in amyl acetate, with an addition of ether, alcohol, alum, talc, asbestos or mica, elasticity being imparted by vaseline oil or oil of lavender. Celluloid varnishes are capable of standing a certain amount of heat.

Selmar Mayer's Recipe.—A heat-resisting varnish for iron ware, especially iron stoves, etc., is prepared by mixing powdered liver of sulphur, cyanide of potash, bicarbonate of soda, and sufficient cassel brown to give the desired colour, and the mixture is saturated with alcohol. The pulp is passed through a sieve to remove coarse particles and after being applied to the metal, is exposed to a temperature of 200 to 300° C. Other fire-proof pigments may be substituted for the brown. This preparation is an enamel rather than a paint, but will stand heat very well.

Syracuse Tar.—A mixture of finely ground alum, asbestos, and borax or boric acid, is stirred into melted coal tar, the proportions being 60 to 65 or 40 to 50 parts of tar, 8 to 4 or 2 to 8 of alum, 20 to 5 or 38 to 30 of boric acid, 12 to 5 or 20 to 13 of borax, and 5 to 8 of asbestos. The idea seems to be that the salts will sinter together under the influence of heat, the tar being presumably carbonised.

Avenarius's Recipe.—Ten parts of alkali silicate are heated under pressure with 25 parts of casein, a pasty mass being formed, whilst about 10 parts of a liquid mixture of casein and alkali silicate are deposited. This liquid is mixed with 0·2 part of carbonate of magnesia and 0·1 part of borax, to increase the heat-resisting properties, whereupon 0·15 part of zinc oxide, 0·3 part of sodium phosphate, and a suitable quantity of lime and earthy pigment is added to give covering power. For use, the mass is thinned with boiling water, and is said to stand a temperature of 100° C. (212° F.).

Fairweather's Recipe.—Equal parts of silicon carbide and semi-fluid alkali silicate are mixed together, 3 to 10 per cent. of chalk being added.

Hall's Fire-proof Paint consists of moist silicate of magnesia, 5½ dextrine, 5½ gypsum, 2 of chalk, 2 of alum, and 1 of common salt. Four parts of this powder are mixed with three of boiling water, for use. This preparation and the preceding one owe their fire-resisting properties to the sintering of the salts when heated.

Eymer's Fire-proof Varnish is compounded of a mixture of alkali silicates with asbestos or other fire-proof material, and vegetable or mineral oils, or oily substances like glycerine.

Fire-proof Paint.

	Lb.
Finely pulverised glass	20
Finely pulverised porcelain	20
China stone in powder	20
Quicklime	10
Silicate of soda, liquid	30

The solid elements having been powdered as finely as possible and sifted, are moistened and intimately mixed with the silicate and thinned down with water. This yields a mass of syrupy consistence that may be employed for painting, either alone or mixed with colour. The addition of lime gives a certain unctuosity to the mass for whitewashing, and its combination with the silicic acid of the silicate of soda serves to bind the other materials together. The proportions

of the different elements above mentioned may be altered, but that of the silicate of soda must remain constant. These elements may even be replaced one by another, but it is always well to preserve the lime. Instead of silicate of soda, silicate of potash might be used, but the former is less expensive. The coating is applied with a brush, as other paints are, as uniformly as possible over the surface to be protected. The first coat hardens immediately, and a second one may be applied six hours or more afterwards. Two coats are sufficient. The paint may likewise be employed as a preservative against rust, and used as a coating for iron bridges, etc.

Fire-proof Paint.

40 lb. of asbestos powder, 10 lb. of aluminate of soda, 10 lb. of lime, and 30 lb. of silicate of soda, to which may be added any desired colouring and water to make to a working consistence.

Fire-proof Paint.

A fire-proof paint with an aqueous vehicle is made from 40 lb. of fine-ground glass, 40 lb. ground porcelain, 40 lb. china clay, 20 lb. quicklime. These are ground up very finely, and then mixed with 60 lb. liquid silicate of soda, and sufficient water to make into a liquid of suitable consistence for application. The proportions given above can be varied if desired, and colouring matters such as ultramarine, Venetian red, Indian red, oxide of iron, yellow ochre, sienna and umber can be added to produce a coloured paint. The paint so made is used with a brush in the ordinary way, it dries in a few hours. Two coats are given. In place of using china clay, asbestos may be used with good results.

Fire-proof Paint.

Grind 7 lb. of zinc white and 3 lb. of air-slaked lime in one quart of fat linseed oil, then add one quart of water-glass of 33°, and stir into the mixture 5 lb. of dry white lead and 1 lb. of sulphate of zinc. Thin with soft water to proper consistency and use immediately.

Water-proof Paint.

Boil 7,500 parts of linseed oil with 331 parts of rosin, 330 parts of litharge, 50 parts red lead, and 50 parts umber; gradually add 230 parts of zinc vitriol and a solution of 350 parts caustic potash, 350 parts of alum, 15,000 parts of chalk, 1,000 parts of zinc white, with

3,000 parts of water, in which 40 parts of alum have been boiled; then add a decoction of 750 parts of glue with 2,000 parts of water. The paint is mixed with 2,000 to 2,500 parts of varnish, and the mixture thinned with petroleum.

Gold Paint.

	Lb.	Oz.
Bronze powder	12	0
Powdered mother-o'-pearl	2	0
Powdered lime	0	8
Turps	2 gallons.	
Gold size	2 gallons.	

Method.—Mix the turps and gold size with the lime, shake well and leave for a day or two, then draw off the clear portion without disturbing any sediment, and mix with the bronze and pearl. If about 1s. 6d. per lb. is paid for the bronze, this will produce a very satisfactory article.

Dark Green Paint.

Mix 126 lb. of Brunswick green, 10 lb. white lead, 42 lb. barytes, 20 lb. boiled linseed oil, 50 lb. raw linseed oil and turps as required.

Lead-Colour Paint.

Mix up 1 cwt. of best white lead paint, and ½ cwt. black paint.

Mast-Coloured Paint.

This, although at first sight rather simple-looking, is in actual practice rather difficult to get to one's satisfaction. The following recipe gives very good results.

	Parts.
Genuine dry white lead	1
French ochre J. F. L. S.	2
Grey barytes	12
Red oxide of iron (genuine)	1

Phosphorescent Paint.

Take oyster shells and clean them with warm water. Put them into a furnace for half an hour, at the end of that time take them out and let them cool. When quite cold pound them fine and take away any grey parts, as they are of no use. Put the powder into a

crucible, in alternative layers with flower of sulphur. Put on the lid and cement with sand, made into a stiff paste with beer. When dry put into the fire and bake for an hour. Wait until quite cold before opening the lid.

The product ought to be white; all grey parts are separated out as they are not luminous. Make a sifter in the following manner: Take a jam-pot, put a piece of very fine muslin very loosely across it, tie round with string; put the powder into the top and rake about with a bit of stick until only the coarse powder remains. The fine powder in the jam-pot is mixed into a thin paint with gum water, as two thin applications are better than one thick one.

Luminous Paint.

Mix 100 parts of carbonate and phosphate of lime (obtained by heating or calcining shells) with 100 parts of burned lime, then add 25 parts of calcined sea salt and 25 to 50 per cent. of the entire quantity (*i.e.*, 66 to 112 parts) of sulphur, finally admix 6 to 7 per cent. of a luminous substance made from a combination of sulphur with barium, calcium, strontium, magnesium or aluminium added, and mix with varnish.

Blue Luminous Paint.

A blue luminous paint is prepared from 42 parts varnish, 10·2 parts prepared barium sulphate, 6·4 parts ultramarine blue, 5·4 parts cobalt blue, and 46 parts luminous calcium sulphide.

Yellowish-Brown Luminous Paint.

A yellowish-brown luminous paint is obtained from 48 parts varnish, 10 parts precipitated barium sulphate, 8 parts auripigment, and 34 parts luminous calcium sulphide.

Green Luminous Paint.

A green luminous paint is prepared from 48 parts varnish mixed with 10 parts prepared barium sulphate, 8 parts chromium oxide green, and 34 parts luminous calcium sulphide.

Grey Luminous Paint.

For grey luminous paint, 45 parts of the varnish are mixed with 6 parts prepared barium sulphate, 6 parts prepared calcium carbonate, 0·5 part ultramarine blue, 6·5 parts grey zinc sulphide, and 36 parts luminous calcium sulphide.

Orange Luminous Paint.

	Parts.
Indian yellow	11·0
Madder lake	11·5
Luminous calcium sulphide	38·0
Varnish	46·0
Barium sulphate	17·5

Red Luminous Paint.

	Parts.
Barium sulphate in fine powder	8
Prepared Madder lake	2
Luminous calcium sulphide	30
Prepared varnish	60
Prepared realgar	36

Mix to an emulsion and grind very fine in a colour mill.

Violet Luminous Paint.

A violet luminous paint is made from 42 parts varnish, 10·2 parts prepared barium sulphate, 2·8 parts ultramarine violet, 9 parts cobalt arseniate, and 36 parts luminous calcium sulphide.

Yellow Luminous Paint.

For yellow luminous paint 48 parts varnish are mixed with 10 parts prepared barium sulphate, 8 parts barium chromate, and 34 parts luminous calcium sulphide.

Luminous colours for artists' use are prepared by using pure East India poppy oil in the quantity instead of the varnish, and taking particular pains to grind the materials as fine as possible.

All the above paints can be used in the manufacture of coloured papers, etc., if the varnish is altogether omitted, and the dry mixtures are ground to a paste with water. The luminous paints can also be used as wax colours for painting on glass and similar objects, by adding, instead of the varnish, 10 per cent. more of Japanese wax, and one-fourth the quantity of the latter of olive oil. The wax colours prepared in this way may also be used for painting upon porcelain, and are then carefully burned without access of air. Paintings of this kind can also be treated with water-glass.

Derby Red Paint.

Mix 2 lb. white lead, 54 lb. Venetian red, 124 lb. barytes, 36 lb. raw linseed oil, 36 lb. boiled linseed oil, and turps as required.

Indian Red Paint.

Mix 9 lb. Indian red, 4 lb. barytes, 4 lb. raw linseed oil, 5 lb boiled linseed oil, and thin with turps as required.

Transparent Paint for Glass.

Take for a blue pigment, Prussian blue; for red, crimson lake; for yellow, Indian yellow; for brown, burnt sienna; for black, lampblack; and for other shades, a mixture of the appropriate colours. Rub them in a size made as follows: Venice turpentine 2 oz., turpentine 3 oz., and apply with a brush. For temporary purposes, fine and brilliant colours are obtained by dissolving aniline dyes in white shellac varnish, but they are often fleeting colours, and do not always pay for the trouble.

White Paint.

Mix 14 lb. white lead, 4 oz. driers, 4 pints each of raw and boiled linseed oil, and ½ pint turps. If the work is to be finished white, care must be taken to use pure white lead, and raw linseed oil. The brushes and tins must be quite clean; after mixing the paint must be kept covered to prevent discoloration.

Light Yellow Paint.

Mix 14 lb. Paris white, 28 lb. barytes, 28 lb. Derby ochre, 1½ lb. lemon chrome, 11 lb. raw linseed oil, 28 lb. boiled linseed oil, and turps as required.

Deep Yellow Paint.

Mix 14 lb. Paris white, 25 lb. Derby ochre, 28 lb. barytes, 2½ lb. dark ochre, 11 lb. raw linseed oil, 28 lb. boiled linseed oil, and turps as required.

Paint for the Mortar of Brick Walls.

84 parts of fine drifting sand, 12 parts of unslaked lime, and 4 parts of skim-milk cheese that has been pressed through a wire sieve. These substances are to be first well mixed dry, then with a sufficient quantity of hot, not boiling, water, prepared for application. The paint must be quickly applied.

Paint for Rough Cast Surfaces.

Take a 50-gallon barrel and place therein one half bushel of builders' lime, fresh burnt, over which pour hot water, say about 10 gallons, and cover tightly to keep in the steam while slaking. Let stand covered overnight, then strain the liquid through a fine sieve into another barrel; add 7 lb. of common salt previously dissolved in hot water. In the meantime, cook 3 lb. of rice-flour in hot water to a cream paste, and add this while hot; always stirring well. 5 lb. of bolted whiting are also mixed with soft water to a thin paste, and added to the liquid. Finally, 1 lb. of pale glue that has been soaked in water overnight is boiled as usual in water to make 5 gallons of liquid glue, which is put in with the other. Stir well, and if the total does not amount to 30 gallons add enough hot water to make that quantity. Let the barrel stand covered for several days more, when the wash is ready for use. The wash must be applied fairly warm, therefore it is necessary to have the pots from which the paint is used standing in hot water during the operation. Two coats of this wash will stand out white on any surface, and it may be tinted with mineral colours, as in the case of the common wash. It is a most durable and economical coating for brick or rough cast walls.

Paint for Wall Signs.

For a large sign on a rough dead wall, rock or cliff, stir a solution of copperas into some milk of lime; this will give a greenish paste, and in time will turn yellow, after application. The more copperas, the deeper the yellow. This paint will adhere well to the surface coated with it, not readily washing off. It is a brighter colour than where ochre and lime are used, and makes a good background for black or purple letters. Another cheap paint may be made from 150 lb. of whiting mixed to a paste with water. Then add 6 gallons of hot soft soap. Now break up 60 lb. of white lead in 3 gallons of boiled oil, and when mixed to a paste add 3 gallons more of oil; now stir the whiting and lead together. The mass should really be run through a paint mill, to make it smooth, but perfect mixture with a paddle will do, with careful straining also.

Mixing Oil Colours and Tints.

Ash Ground.—100 parts white lead, 4 parts French ochre, and 1 part raw Turkey umber.

Cherry Ground.—100 parts white lead, 5 parts burnt sienna, and 1 part raw sienna.

Light Maple Ground.—100 parts white lead, and 1 part French ochre.

Dark Maple Ground.—100 parts white lead, and 1 part dark golden ochre.

Light Oak Ground.—50 parts white lead, and 1 part French ochre.

Dark Oak Ground.—50 parts white lead and 1 part dark golden ochre.

Mahogany Ground.—10 parts white lead, 5 parts orange chrome, and 1 part burnt sienna.

Rosewood Ground.—Drop black.

Walnut Ground.—50 parts white lead, 3 parts dark golden ochre, 1 part dark Venetian red, and 1 part drop black.

Blue Black A.—9 parts lampblack, and 1 part Chinese Prussian blue.

Blue Black B.—19 parts drop black, and 1 part Prussian blue.

Bright Mineral.—9 parts light Venetian red, and 1 part red lead.

Brilliant Green.—9 parts emerald green, and 1 part C. P. chrome green, light.

Bronze Green, Light.—3 parts raw Turkey umber, and 1 part medium chrome yellow.

Bronze Green, Medium.—5 parts medium chrome yellow, 3 parts burnt Turkey umber, and 1 part lampblack.

Bronze Green, Dark.—20 parts drop black, 2 parts medium chrome yellow, and 1 part dark orange chrome.

Bottle Green.—5 parts commercial chrome green, medium, and 1 part drop black.

Brown Stone.—18 parts burnt umber, 2 parts dark golden ochre, and 1 part burnt sienna.

Cherry Red.—Equal parts of best imitation vermilion and No. 40 carmine.

Citron A.—3 parts medium chrome yellow, and 2 parts raw umber.

Citron B.—6 parts burnt Turkey umber, 2 parts French chrome, and 1 part burnt sienna.

Emerald Green.—Use emerald green alone.

Flesh Colour.—19 parts French ochre, and 1 part deep English vermilion.

Fern Green.—5 parts lemon chrome yellow, and 1 part each of light chrome green and drop black.

Foliage Green.—3 parts medium chrome yellow, and 1 part of ivory or drop black.

Foliage Brown.—Equal parts Vandyck brown and orange chrome yellow.

Golden Ochre.—14 parts French yellow ochre, and 1 part medium chrome yellow, for the light shade; and 9 parts Oxford ochre, and 1 part orange chrome yellow, for the dark shade.

Gold Russet.—5 parts lemon chrome yellow, and 1 part light Venetian red.

Gold Orange.—Equal parts of dry orange mineral and light golden ochre in oil.

Indian Brown.—Equal parts of light Indian red, French ochre and lampblack.

Mahogany, Cheap.—3 parts dark golden ochre, and 1 part of dark Venetian red.

Maroon, Light.—5 parts dark Venetian red, and 1 part drop black.

Maroon, Dark.—9 parts dark Indian red, and 1 part lampblack.

Olive Green.—7 parts light golden ochre, and 1 part drop black.

Ochrous Olive.—9 parts French ochre, and 1 part raw umber.

Orange Brown.—Equal parts of burnt sienna and orange chrome yellow.

Oriental Red.—2 parts Indian red, light, in oil, and 1 part dry white lead.

Purple.—2 parts rose pink, and 1 part ultramarine blue.

Purple Black.—3 parts lampblack, and 1 part rose pink, or 9 parts drop black, and 1 part rose pink.

Purple Brown.—5 parts Indian red, dark, and 1 part each of ultramarine blue and lampblack.

Roman Ochre.—23 parts French ochre, and 1 part each of burnt sienna and burnt umber.

Royal Blue, Dark.—18 parts ultramarine blue, and 2 parts Prussian blue. To lighten, use as much white lead or zinc white as is required.

Royal Purple.—2 parts ultramarine blue, and 1 part carmine lake.

Russet.—14 parts orange chrome yellow, and 1 part C. P. chrome green.

Seal Brown.—10 parts burnt umber, 2 parts golden ochre, light, and 1 part burnt sienna.

Snuff Brown.—Equal parts of burnt umber and golden ochre.

Terra Cotta.—2 parts white lead, and 1 part burnt sienna, also 2 parts French ochre to 1 part Venetian red.

Turkey Red.—Strong Venetian red or red oxide.

Tuscan Red, Ordinary.—9 parts Indian red to 1 part rose pink. Brilliant, 4 parts Indian red to 1 part red Madder lake.

Violet.—3 parts ultramarine blue, 2 parts rose lake, and 1 part best ivory black.

Yellow, Amber.—10 parts medium chrome yellow, 7 parts burnt umber, and 3 parts burnt sienna.

Yellow, Canary.—5 parts white lead, 2 parts permanent yellow, and 1 part lemon chrome yellow.

Yellow, Golden.—10 parts lemon chrome yellow, 3 parts deep orange chrome, and 5 parts white lead

Yellow, Brimstone.—3 parts white lead, 1 part lemon chrome yellow, and 1 part permanent yellow.

Blue Tints.

Azure Blue.—50 parts white lead, and 1 part ultramarine blue.

Blue Grey.—100 parts white lead, 3 parts Prussian blue and 1 part lampblack.

Bright Blue.—20 parts zinc white, and 1 part imitation cobalt blue.

Blue, Grass.—7 parts white lead, 2 parts Paris green, and 1 part Prussian blue.

Deep Blue.—15 parts white lead, and 1 part Prussian blue, or Antwerp blue.

French Blue.—5 parts imitation cobalt blue, and 2 parts French zinc white.

Green Blue.—100 parts white lead, 5 parts lemon chrome yellow, and 3 parts ultramarine blue.

Hazy Blue.—60 parts white lead, 16 parts ultramarine blue, and 1 part burnt sienna.

Mineral Blue.—5 parts white lead, 4 parts imitation cobalt blue, 2 parts red Madder lake, and 1 part best ivory or drop black.

Theatrical Grease Paints.

The base for grease paints is two parts of lard or cocoanut fat mixed with one part of white wax, or petroleum jelly or paraffin wax

may be used. Grease paint is put up in cylinders about 4 inches long and ¾ inch in diameter, and in making a stick of flesh-tinted paint pigments in the following small quantities will be required:- No. 1 tint, deepest: as much vermilion as will cover a sixpence. No. 2 tint, medium: one-third larger quantity of a mixture of equal parts of vermilion and zinc white. No. 3 tint, palest: Same quantity as No. 2 of a mixture of one part of vermilion and two parts of zinc white. In mixing the colours with the base, warm the latter and rub in the pigments with a palette knife, force into a tube, which is to serve as the mould, and when cold, push out the grease paint with a round piece of wood and wrap in tinfoil. Another way of making flesh-tinted paint is to mix together 3 drams of vermilion, 2 drams of tincture of saffron, 5 drams of powdered orris root, 20 drams of precipitated chalk, 20 drams of oxide of zinc, 20 gr. of camphor, 20 minims of oil of peppermint, 1 dram of bouquet essence, and sufficient almond oil to form a paste.

Brown Theatrical Grease Paint.

Melt six parts of cacao butter or other base, mix in one part of burnt umber, and when nearly cold add five drops of oil of neroli.

Deep Red Theatrical Grease Paint.

Make into a paste with sufficient almond oil, 15 drams each of oxide of zinc, subnitrate of bismuth and plumbate of alumina; colour with 30 gr. of carmine dissolved in 80 minims of liquor ammoniae, and perfume with 12 minims of oil of peppermint, 12 gr. of camphor, and 1½ drams of bouquet essence.

Rose-Colour Theatrical Grease Paint.

Colour a lard and wax base made from 2 lb. lard and 1 lb. paraffin wax with sufficient Madder lake to tint it.

White Theatrical Grease Paint.

Mix together 1 oz. each of oxide of zinc, subnitrate of bismuth, and plumbate of alumina, and 5 or 6 drams of almond oil. This paste is perfumed by incorporating with 12 gr. of camphor 12 minims of oil of peppermint and 1 dram of bouquet essence.

Yellow Theatrical Grease Paint.

Incorporate equal parts of yellow ochre, precipitated chalk, and oxide of zinc, and make into sticks with mutton suet or white vaseline. For pale yellow use more oxide of zinc.

Varnish Remover.

For a cheap paste or cream paint or varnish remover take kieselguhr as the solid part of the paste, and a mixture of equal parts of carbolic acid, naphthalene, benzol, acetone and solvent naphtha for the solvent portion. The solvent naphtha is of the wood spirit type.

Paint Remover.

Rosin	14 lb.
Caustic soda	6 lb.
Soft soap	4 lb.
Crude carbolic acid (30 per cent.)	7 gallons.
Water	$4\frac{1}{2}$ gallons.

Method.—Dissolve caustic soda in $2\frac{1}{2}$ gallons of the water, then add rosin, and turn in soft soap when the former has dissolved. Keep heating, and stir well, then gradually pour in the remainder of the water, stir, add carbolic as above, and cover while cooling, as the carbolic is apt to volatilise.

Paint Remover.

Not injurious to wood or the user's skin.

Caustic soda	28 lb.
Spent tan or peat moss	24 lb.
Water	14 gallons.
Petroleum	3 gallons.

Method.—Mix water and oil, then grind all together.

Paint Remover.

The product is solid or liquid, according as paraffin wax is included in its composition or not. A typical recipe is: Pure crystallisable benzine 200 parts, denatured alcohol 200, acetone 50, paraffin wax 25, ordinary yellow rosin 25, carbon di-sulphide 25, amyl-acetate 5 parts. The paraffin wax is dissolved in the hot benzine, preferable on the water-bath, the other ingredients being added afterwards.

Paint Removers.

(1) Equal parts of water-glass (38-40 deg. B.). and caustic soda (40 deg. B.). This mixture must not be left too long in contact with the paint, or it will penetrate the wood and injure the subsequent coat of paint. (2) Potato starch is stirred to a workable paste with cold caustic soda solution (25-30 deg. B.). (3) A thick paste is prepared by mixing potato starch with strong soda lye (43 deg. B.). and add sufficient water-glass (38-40 deg. B.) to make the mass workable. (4) 50 parts of soft soap are mixed with 20 parts of caustic potash (20 deg. B.) and 10 parts of water-glass (38 deg. B.). (5) Equal parts of ammonia, soda and slaked lime are mixed to a thin pulp with water, and applied to the paint to be removed. (6) Carragheen moss is extracted by boiling with water and strained, the solution being mixed with its own weight of soda lye (30-35 deg. B.) and the whole concentrated to a workable mass. Other gum mucilages such as tragacanth, gum arabic, etc., may be used for the same purpose. (7) According to a Danish patent (9,221), caustic soda is mixed with a hygroscopic salt, such as calcium or magnesium chloride, and pipeclay, a little camphor being added. This preparation is said to prevent the wood from becoming soft, and to accelerate the removal of the paint. (8) Soft soap is dissolved in twice its weight of water, and mixed with crude carbolic acid, the amount of which is equal to that of soap. (9) Six parts of caustic soda are dissolved in 50 parts of water, and 4 parts of soft soap, and 16 parts of rosin are added, the mass being boiled until all the rosin is saponified, after which 70 parts of carbolic acid are incorporated with the mixture.

Compound for Removing Varnish, Paints, etc.

Place in a suitable wooden trough 15 gallons of water, and add thereto 10 pecks of unslaked lime; let it remain until the lime is well slaked, then add 15 gallons more water, so as to produce a milk of lime, to which when cool is to be added from 30 to 35 lb. weight of treacle. The ingredients must be well stirred so as to become thoroughly mixed, and 70 gallons more water added. The liquid may then be drawn off and strained into a copper or boiler.

10 stones of flour (mixed in from 35 to 40 gallons of water) are to be added to the lime water in the copper, when the whole mass must be well stirred for about half an hour, and then boiled

or heated to about 200° F. for some twenty minutes, gradually adding 4½ cwt. of common carbonate of soda, and taking care to keep the mixture continually stirred during the boiling. The liquor is then drawn off and strained, and, when cool, a gallon of carbolic acid is added for the purpose of preventing the preparation undergoing decomposition. This compound may be used either for cleaning paint, for which purpose it must be diluted, or for softening paint, varnish or japan preparatory to removing the same from a wooden or other surface, and for removing oxide or dirt from the surface of metals. This preparation may be made up for the market in either a liquid, semi-liquid or a solid form, the latter being obtained by evaporation.

Beaumontique.

Beaumontique, also called "Beaumont Egg" by the illiterate, is a stopping for wood, being composed of shellac gum one tablespoonful, powdered rosin one teaspoonful, beeswax of about the size of a walnut, all of which are placed in an iron pot and set on the stove till melted. For mahogany add a little Venetian red; for oak add yellow ochre or raw sienna; for ebony or rosewood add lampblack. Mix all well together. It may be used either in the liquid state or hard. Make it into sticks like sealing-wax by pouring it out on a board, a little at a time, and rolling it with another board slightly warmed. Sticks of several colours may be made, ready for use. When ready to use it the stuff may be softened by holding over a gas or other light, then apply it to the parts that need to be filled; level up with a chisel or putty knife, and smooth down with fine sandpaper.

Filling up Powder.

Barytes	99 lb.
Borax	3 oz.
Brown soap	12 oz.
Raw linseed oil	4 pints.
Thin strong drier	4 pints.
Turpentine	4 pints.
Water	4 pints.

Grind all together; by adding ochre or red oxide or lampblack it may be tinted any shade.

Filling up Powder.

Silica	100 lb.
China clay	16 lb.
Raw linseed oil	3 gallons.
Turpentine Japan	3 gallons.

Grind all together.

The above is the white base, which is coloured as required by addition of yellow ochre, umber, red, oxide or other pigment.

Filling up Powder.

Silica	100 lb.
Soapstone	35 lb.
Raw linseed oil	2½ gallons.
Grinding Japan	½ gallon.
Thin strong liquid drier	3 gallons.

Grind all together. To colour it add :—

Vandyck brown	3 lb.
Burnt sienna	1½ lb.
Burnt umber	2¼ lb.

Filling up Liquors.

China clay	60 lb.
Carbonate of magnesia	40 lb.
Rosin coach varnish	12 gallons.
Turpentine	15 gallons

Grind the china clay and the magnesium carbonate with the varnish, then thin own with the turpentine.

Filling up Liquors.

China clay	75 lb
Raw linseed oil	7 gallons.
Turpentine	8 gallons.
Rosin varnish	15 gallons.

Grind the china clay with the rosin varnish and linseed oil, then thin down with the turpentine.

Wood Filler.

An American inventor has patented a new wood filler and primer compound, composed substantially as follow: A quantity of linseed oil is boiled for about four hours; then a quantity of litharge is added and perfectly mixed with the boiled oil; the mass is then boiled for another hour, then a quantity of sugar of lead is mixed and the mass is boiled until it becomes the consistency of honey; then it is removed from the fire and benzine added until the mass is of the consistency of varnish. Then add and mix in a quantity of talc. The proportions are as follows: One gallon of raw oil to be boiled to the consistency of thick honey; litharge ½ lb.; sugar of lead ¼ lb., and talc about 4 lb., with the necessary quantity of benzine for reduction.

Filler up for Nail Holes.

As a material for filling up nail holes in wood and broken places the following is recommended as simple and effectual. Take fine sawdust and mix into a thick paste with glue, pound it into the hole, and when dry it will make the wood as good as new.

Filling for Cracked Ceilings.

Whiting mixed with glue water, or plaster of Paris and water, makes a good putty for filling cracks in plastered ceilings.

Filling for Floors.

A very complete filling for open cracks in floors may be made by thoroughly soaking newspapers in a paste made of 1 lb. of flour, 3 quarts of water, and a tablespoonful of alum, thoroughly boiled and mixed; make the mixture about as thick as putty, a kind of paper putty, and it will harden like papier-mâché.

Filling for Letters in Brass, Zinc and Copper Signs.

The cement or filling for the letters of metal signs is made by mixing intimately equal parts of asphaltum, shellac and lampblack. The asphaltum and shellac must be powdered, and the mixture is applied by heating the plate and melting in the cement, smoothing it off with a warm iron. Scrape off the surplus carefully and hold a warm iron over the letters to glaze their surface. Black sealing-wax will also answer the purpose of filling in, and the treatment is similar.

If the signs cannot be heated, make a putty from dry lampblack, asphaltum varnish and brown japan, and fill the spaces, pressing the putty well in with the putty knife, then clear the edges with turpentine. When the filling is dry, polish the whole plate.

Boiled Linseed Oil Substitute.

This forms a fair boiled or drying oil, also a cheap durable varnish, as well as being very useful to form paint thinnings, terebenes and gold sizes.

Ground rosin	80 lb.
Quicklime	4½ lb.
Sulphate of zinc crystals	4¼ lb.
Russian petroleum	13½ gallons.
Rosin oil	2 gallons.
Water	1¼ gallons.

Melt down rosin in the oils; slake the lime in one half of the water; dissolve the zinc crystals in the rest. Add the lime solution to the heated oils, stirring well, then treat zinc solution in the same way. Keep the oil warm, and continue stirring until the sulphate of calcium falls, then run off and settle.

Linseed Oil Substitute.

Pale ground rosin	56 lb.
Quicklime	3 lb.
Russian petroleum	10 gallons.
Rosin oil	2 gallons.
Genuine linseed oil	1 gallon.
Water	¾ gallon.
Terebene drier	½ gallon.

Run down the rosin in the petroleum, add rosin oil, linseed oil and terebene; mix lime with water, add this to others with constant stirring, then keep warm until the lime precipitates. Lastly, run off the clear oil into the stock tanks to settle. Though not quite so cheap as some substitutes, this is a very good oil for many purposes.

Linseed Oil Substitute.

Although a good drier, this mixture is more suited to sell as a "raw linseed oil". In addition it forms a cheap fair quality varnish, and is a good thinner for paints, etc., with or without using turps.

	Cwt.	Qr.	Lb.
"Testefas" kerosene	1	0	0
Pale ground rosin	0	0	74
Quicklime	0	0	4
Rosin oil	1¼ gallons.		
Water	6 pints.		

Put kerosene, rosin and rosin oil into the pot and apply heat; when rosin melts add the lime, stirring well; then add the water; continue stirring, cool, settle and run off from settlings.

Although the compiler has included these recipes for boiled oil substitutes, he cannot recommend them. They will be found most unsatisfactory in use, being deficient in drying power.

Turpentine Blend, Common, No. 1.

	Cwt.	Qr.	Lb.
Pure American turpentine	3	0	0
White rose petroleum oil	0	0	14

Turpentine Blend, Common, No. 2.

	Cwt.	Qr.	Lb.
Pure American turpentine	3	0	0
White rose petroleum oil	1	0	0
Rosin spirit	0	0	½

Turpentine Blend, Common, No. 3.

	Cwt.	Qr.	Lb.
Pure American turpentine	3	0	0
White rose petroleum oil	1	0	0
Rosin spirit	0	0	5

Turpentine Blend, Common, No. 4.

	Cwt.	Qr.	Lb.
Pure American turpentine	3	0	0
White rose petroleum oil	2	0	0
Rosin spirit	0	0	10

Turpentine Blend, Common, No. 5.

	Cwt.	Qr.	Lb.
Pure American turpentine	3	0	0
White rose petroleum oil	3	0	0
Rosin spirit	0	0	14

Turpentine Blend, Common, No. 6.

	Cwt.	Qr.
Pure American turpentine	3	0
White rose petroleum oil	3	0
Rosin spirit	0	2

Turpentine Substitute.

Rosin	3 lb.
Sandarac	1 lb.
Rosin spirit	10 gallons.
Coal-tar naphtha	10 gallons.
Shale naphtha	10 gallons.
Petroleum oil	10 gallons.

This is on the same lines as the last, but is much cheaper, although not as efficient.

Turpentine Substitute.

Rosin	2 lb.
Sandarac	2 lb.
Turpentine	10 gallons.
Rosin spirit	10 gallons.
Petroleum spirit	20 gallons.

This differs from other substitutes in containing a small quantity of resinous matter, which acts as a binding material to the pigment of the paint, and brings it nearer in its properties in this respect to turpentine.

Turpentine Substitute.

	Gallons.
Turpentine	10
Benzol	10
Petroleum spirit	20

This will make an excellent substitute, not so cheap as the last, but still inexpensive. It will work well with all oils and colours, and is almost entirely volatile on exposure to air. To make these substitutes as safe as possible, the petroleum spirit which is used should be a heavy one.

Turpentine Substitute.

	Gallons.
Petroleum spirit	20
Rosin spirit	10
Coal-tar naphtha	10

In preparing this, which is a cheap substitute, no turpentine is used. Coal-tar naphtha has excellent solvent properties for oils and rosins, while it is readily volatile. This mixture is, if anything, rather more inflammable and volatile than turpentine.

Turpentine Substitute.

	Gallons.
Turpentine	10
Rosin spirit	10
Petroleum oil	10
Coal-tar naphtha	10

The petroleum oil is apt to leave behind a small amount of oily residue which is undesirable. It may be replaced by petroleum spirit with advantage, but the cost will be greater.

Turpentine Substitute.

	Gallons.
Turpentine	10
Coal-tar naphtha	10
Petroleum spirit	20

This makes a cheap and yet excellent substitute for turpentine. The petroleum spirit should have a gravity of 0·790 or thereabouts. This is rather heavier than benzoline, and yet lighter than kerosene oil.

Turpentine Substitute.

	Gallons.
Turpentine	20
Rosin spirit	10
Heavy benzoline	10

This makes a fairly good product, and not very expensive. The rosin spirit and benzoline are the cheapest substitutes that can be found. The turpentine which is used adds to the cost, but materially improves the quality.

Much depends upon the quality of the rosin spirit used; this

ought to be a carefully refined product, as when such is not the case rosin spirit is apt to make the paint work livery and to harden in the can.

Staining Fluid for Darkening Furniture.

	Oz.
Alkanet root	1
Shellac varnish	4
Turpentine	2
Scraped beeswax	2
Linseed oil	20

Digest the alkanet root in the oil and pound it up in a mortar, then add the turpentine, in which the beeswax can be dissolved by heating. Finally mix all into the shellac varnish. A much simpler process consists in beating up 1 oz. of alkanet root, and 1 oz. of rose fruits in 20 parts of linseed oil.

Oil Stains for Wood.

For walnut: Burnt umber ground in oil; thin it to suit with oil $\frac{1}{4}$, turps $\frac{3}{4}$; put on heavy it will make the wood dark; if put on lightly the stain will be lighter toned. This applies to all oil wood stains. Instead of umber Vandyck brown may be used. This makes a more transparent stain than umber; it is also more nearly of the shade of the average American black walnut, but it is more likely to fade out than umber is. *For mahogany:* Burnt sienna, to which may be added enough raw sienna to tone the shade down as it may be wanted. As many have different ideas as to what a mahogany colour should be, and as, in reality, the wood itself varies so much in its shades, each person can mix it to suit himself. In addition to the siennas, some burnt umber may be added, if an old mahogany effect is wanted. *For cherry:* Raw sienna and burnt sienna in proportion to suit; however, the raw sienna should predominate. *For light oak:* Raw sienna and some raw umber with a mere trifle of burnt sienna *For dark oak:* Raw sienna and burnt umber, with a trifle of ivory black. After proper thinning apply with a brush. If necessary to lighten it, rub off a portion with a clean rag.

Black Walnut Stain.

An excellent black walnut stain is made as follows: 1 quart of asphaltum, 1 oz. of burnt umber in oil, mix with 1 quart of turpentine. If too strong add more turps; try it on white wood.

Walnut Stain for Wood.

Water, 1 quart; washing soda 1½ oz., Vandyck brown 2½ oz., bichromate of potash ¼ oz.; boil for ten minutes, and apply with brush either hot or cold.

Imitation Walnut.

Take Brunswick black, thin it down with turpentine and then add about one-twentieth its bulk of rosin varnish. This mixture, it is said, will dry hard and take varnish well.

Reddish-brown Stain for Wood.

The wood is first washed with a solution of 1 lb. of copper sulphate in 1 gallon of water, and then with ½ lb. of potassium ferrocyanide dissolved in 1 gallon of water. The resulting brown copper ferrocyanide withstands the weather and is not attacked by insects. It may be covered, if desired, with a coat of linseed oil varnish.

Water Lac Varnish for Paper.

Ammonia 14 oz., shellac 90 oz., water 3 gallons, gelatine 1 oz., glycerine 6 oz. Boil altogether till a solution is obtained. When the varnish is ready for use, it may be applied by rollers or by a grounding machine, and will give the paper an even, rich and waterproof leather finish, furnishing a surface that may be washed with warm or cold water.

To Imitate Botany Bay Wood.

Take of French berries ½ lb. and boil them in 2 quarts of water till a deep yellow solution is got, and with it while boiling give two or three coats to the work; let it be nearly dry, then with black stain, to be used hot, form the grain with the brush. For variety, after giving two or three coats of yellow, give one of strong logwood liquor, which will brighten the colour, and then use the black stain.

Black Stain for Wood.

Make a strong decoction of logwood (which will keep, if heated now and then, a long time), also a solution of sulphate of iron (copperas). Coat the wood with the logwood first, and then with

the sulphate of iron, and a beautiful black stain will be produced, especially if the operations are repeated.

Black Stain for Oak.

Oak may be dyed black and made to resemble ebony by the following means: Immerse the wood for forty-eight hours in a hot saturated solution of alum, and then brush it over with a logwood decoction, as follows: Boil 1 lb. of the best logwood with 1 gallon of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one-half. To every quart of this add ¼ oz. of indigo extract. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdigris in hot concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained.

Golden Stain for Oak.

A stain for oak, to produce the golden effect, may be made with equal parts of gold size, japan, and asphaltum varnish of best quality, thinned with turpentine. This will not raise the grain of the wood and dries quickly and hard. Put plenty of the stain on, rub it in well, and then rub off dry. This leaves the pores of the wood full of stain, while the flakes retain their original bright colour, slightly enhanced by the stain. A paste filling follows, coloured with drop black or Vandyck brown and burnt umber.

Ebony Water Stain.

Nigrosine, water soluble	1 lb.
Oxalic acid	7 oz.
Water	5 gallons

Walnut Water Stain.

Bismarck brown, red shade	8 oz.
Nigrosine	4 oz.
Oxalic acid	5 oz.
Water	4 gallons.

Satinwood Water Stain.

Orange 2	13 oz.
Oxalic acid	5 oz.
Water	5 gallons.

Mahogany Water Stain.

Bismarck brown	15 oz.
Oxalic acid	8 oz.
Water	5 gallons.

Oak Water Stain.

Phosphine	15 oz.
Oxalic acid	6 oz.
Water	5 gallons.

Rosewood Water Stain.

Safranine	½ lb.
Oxalic acid	6 oz.
Water	4 gallons.

Maple Water Stain.

Chrysoidine	14 oz.
Oxalic acid	7 oz.
Water	5 gallons.

Red Birch Water Stain.

Acid brown	15 oz.
Oxalic acid	8 oz.
Water	5 gallons.

Yellow Birch Water Stain.

Quinoline yellow	5½ oz.
Oxalic acid	6 oz.
Water	5 gallons.

Pine Water Stain.

Quinoline yellow	6 oz.
Oxalic acid	5 oz.
Water	4 gallons.

Mediums for Gold Enamel Paints.

The mediums employed as a fixer for the bronze powders should all be free of acid, otherwise the paint is liable to turn green, as metallic foils and powders are readily attacked by acids. For this

reason all mediums should first be shaken up with a little lime, which will neutralise any acid present.

Ethiop Enamel.

Carbon black	3 lb.
Good, hard drying, elastic varnish	2 gallons.

Mix together and thin with:—

Turpentine	$\frac{1}{4}$ gallon.

Azure Enamel.

To each gallon Parian enamel add 1 oz. (or more according to taste) of ultramarine, cobalt, or other suitable blue.

Black Enamel.

Amber	16 oz.
Asphaltum	3 oz.
Rosin	3 oz.
Linseed oil	8 fl. oz.
Oil turpentine	16 fl. oz.

Heat the linseed oil to boiling and add the amber, asphaltum and rosin; when melted, remove to the open air and add gradually the oil of turpentine.

Black Enamel.

	Oz.
Oil tar	16
Asphaltum	4
Rosin, powdered	4

Mix and dissolve with the aid of heat over a water-bath; care being taken to prevent contact with flame; thin down after cooling with sufficient turpentine.

Parian Enamel.

Florence zinc white	5 lb.
White dammar varnish	1 gallon.

Thinner:—

White enamel varnish	1 gallon.
Camphorated turpentine	$\frac{1}{8}$ gallon.

The camphorated turpentine is made by dissolving 2 lb. camphor in 1 gallon turpentine.

Canary Enamel.

To each gallon of the Parian enamel add 1 oz. lemon chrome yellow.

Vermilion Enamel.

Good vermilion	5 lb.
Elastic varnish	½ gallon.

And thin with:—

Turpentine	$\frac{1}{16}$ gallon.

Quick Drying Black.

Asphaltum, best	1 cwt.
Coal-tar naphtha	20 gallons.
Pine essence	1 pint.

Black for Stoving.

	Cwt.	Qr.	Lb.
Asphaltum	1	0	0
Vegetable black	0	1	20
Coal-tar naphtha	20 gallons.		
Rosin spirit	5 gallons.		

To make Putty.

Mix 1 cwt. of whiting and 2 gallons of raw linseed oil. The whiting must be dried, well crushed, and allowed to cool before mixing up with the oil.

Superior Putty.

To make a superior putty for glazing conservatories and skylights, add 4 lb. white lead to 1 cwt. of the above mixture. Do not pack in barrels until cold.

Removing Putty.

Old putty may be softened by using a paste of caustic lye, easily prepared by mixing carbonate of potash or soda with equal parts of freshly burned quicklime, which has been previously slaked with water so as to cause it to fall into powder. This should be mixed with water to a paste, and spread on the putty to be softened. If

one application is not sufficient it should be repeated. In order to prevent the paste from drying too quickly, it is well to mix it with less water and some soft soap. By the application of a hot iron the putty becomes so soft that the glass can be removed with the fingers and the putty scraped away. All that is required is a common soldering-iron. When hot (but not red hot) place the point of the bit against the putty and pass it slowly around the sides of the square. The heat will so soften the putty that it will come away from the wood without difficulty. Some of it may be so hard as to require a second application of the hot iron, but one experiment will give sufficient experience to meet all difficulties.

Drier No. 1.

	Cwt.	Qr.
White barytes	5	0
Paris white	7	0
White lead	0	1
Strong boiled oil	12 gallons.	
Drying liquor No. 2	3½ gallons.	

Put 2 oz. of Paris white into edge-runner or pug-mill, then mix thoroughly with drying liquor into paste; when mixed put in barytes and remaining proportion of Paris white with boiled oil a little at a time; work up for one hour, when it is ready for the rollers.

Drier No. 2.

	Cwt.	Qr.
White barytes	5	0
Paris white	7	2
White lead	0	1
Strong boiled oil	13 gallons.	
Drying liquor No. 2	3½ gallons.	

Ordinary Drier.

	Cwt.	Qr.
White barytes	5	0
Paris white	8	0
White lead	0	1
Strong boiled oil	14 gallons.	
Drying liquor No. 2	3½ gallons.	

Super Zinc Drier.

	Cwt.	Qr.
White barytes	4	0
Zinc white	0	2
Paris white	1	2
Pale boiled oil	$6\frac{1}{2}$ gallons.	
No. 1 liquor	$2\frac{1}{2}$ gallons.	

Fine Zinc Drier.

	Cwt.	Qr.
White barytes	5	0
Zinc white	0	1
Paris white	5	0
Pale boiled oil	12 gallons.	
No. 1 liquor	$2\frac{1}{2}$ gallons.	

Super Powdered French Drier.

	Cwt.	Qr.	Lb.
Borate of manganese	1	0	0
Paris white	0	0	14
White barytes	0	2	0

Ground together through flat stones.

Fine Powdered French Drier.

	Cwt.	Qr.	Lb.
Borate of manganese	1	0	0
Paris white	0	0	14
White barytes	1	0	0

Ground together through flat stones.

Ordinary Powdered French Drier.

	Cwt.	Qr.
Borate of manganese	1	0
Paris white	0	1
White barytes	1	0

Lino Drier.

	Cwt.	Qr.
Litharge flake	0	3
Sulphate of zinc	0	3

	Cwt.	Qr.
Carbonate of lead	0	3
White barytes	4	0
Paris white	4	0
Acetic acid	3½ gallons.	
Linseed oil	3 gallons.	
Boiled oil	3 gallons.	

Put linseed oil, acetic acid and zinc sulphate in pug and mix well for thirty minutes; then add, a little at a time, the litharge and white lead, and allow it to stand overnight; then in the morning add the barytes and the Paris white, with proportions of boiled oil; well grind twice through rollers.

Drying Liquor No. 1.

	Qr.	Lb.
Sulphate of manganese	1	0
Acetate of lime	1	7
Acetic acid	1	0
Water	25 gallons.	

Drying Liquor No. 2.

	Qr.	Lb.
Sulphate of manganese	1	0
Acetate of lime	0	25
Acetic acid	1	0
Water	30 gallons.	

Put manganese and lime in cask or vat with amount of water required, then boil up until thoroughly dissolved; then turn off steam and let cool down; then add acid, well stirring. When all is in, allow to settle, and strain through fine muslin into cask ready for use.

Super Patent Drier.

	Cwt.	Qr.
White barytes	4	0
Paris white	2	2
White lead	0	2
Pale boiled oil	9 gallons.	
No. 1 drying liquor	3 gallons.	

Fine Patent Drier.

	Cwt.	Qr.
White barytes	5	0
Paris white	5	0
White lead	0	1
Pale boiled oil	10½ gallons.	
No. 1 drying liquor	3 gallons.	

Patent Drier.

Mix 12 lb. barytes, 2 lb. whiting, ½ lb. dry white lead, 1 lb. sulphate of zinc, ½ lb. ground litharge, 1 lb. white sugar of lead, and 2½ lb. boiled oil.

Litharge Drier.

	Lb.
Whiting	350
Barytes	225
Litharge	115
Acetate of lead (sugar of lead)	115
Sulphate of zinc	170
White lead	110
Refined linseed oil	34 gallons.

Sugar of Lead Drier.

	Lb.
Sugar of lead	375
White lead	100
Whiting	60
Boiled linseed oil (well settled)	11 gallons.

Sugar of Lead Drier.

	Lb.
White sugar of lead	27
Oxide of zinc	7
Terra alba	7
Refined linseed oil	1 gallon.

In this case the ingredients must be taken, all save the oil, and finely pulverised and thoroughly mixed together and then ground in oil. Thorough mixing and very fine grinding are most important in all such goods.

Borate of Manganese Drier.

	Lb.
Terra alba	100
Borate of manganese	12

Borate of Manganese Drier.

	Cwt.	Qr.	Lb.
Borate of manganese	0	0	80
Oxide of zinc	0	0	60
Barytes	2	0	0

In this case no oil is to be used. The goods are to be ground exceedingly fine, and sifted together, to provide for a complete mixing. The drier is then ready. Keep stored in a close box or paper bags, and use as needed, sifting or sprinkling a little into paint.

Best Quality of Pale Patent Drier.

	Lb.
Whiting	15
Oxide of zinc	4
Sugar of lead	4
Dry white lead	4
Barytes	135
Linseed oil	3½ gallons.

Common Drier.

	Lb.
Sulphate of manganese	7
Litharge	14
Boiled linseed oil	gallon.

Mix these thoroughly together and then run them through a mill. Then add :—

	Lb.
Terra alba	450
Barytes	100
Boiled linseed oil	11½ gallons.

Work this up in a putty mill.

Cheap Pale Patent Drier.

	Lb.
Barytes	160
Whiting	40

	Lb.
Sugar of lead	5
Dry white lead	5
Linseed oil	3 gallons.

Good Quality Drier.

	Lb.
Sulphate of manganese	14
Litharge	30
Water	2 gallons.
Boiled linseed oil	1 gallon.

Run this through a mill and add the following:—

	Lb.
Barytes	140
Dry white lead	200
Whiting	375
Boiled linseed oil	20 gallons.

Linoleate of manganese is made by making a solution of a linseed oil soft soap, and pouring it into a solution of sulphate of manganese solution, draining and drying the precipitated linoleate of manganese. The soap used must be quite neutral, free from excess of caustic potash or potassium carbonate.

Zinc Drier.

	Lb.
Oxide of zinc	50
Borate of manganese	4
Linseed oil	50

In all driers the active ingredients are the compounds of lead and manganese; all the rest are inert, and do not take any part in the drying of the oil or paint and tend to dilute the action of the real drying agents.

Finest Terebene.

	Cwt.	Qr.	Lb.
Medium kauri	0	3	0
Boiled linseed oil	1	1	0
Flake litharge	0	2	0
Resinate of manganese	0	0	13
American turps	6	1	0

Pale Terebene (Super).

	Cwt.	Qr.	Lb.
Pale kauri	0	3	0
Pale boiled oil	1	1	0
Flake litharge	0	1	20
Borate of manganese	0	0	7
American turps	6	0	0

Best Terebene.

	Cwt.	Qr.	Lb.
Medium kauri	0	1	14
Medium rosin	0	1	14
Boiled linseed oil	1	1	0
Flake litharge	0	2	4
Resinate of manganese	0	0	12
American turps	6	1	0

Pale Terebene.

	Cwt.	Qr.	Lb.
Pale rosin	1	0	0
Pale linseed oil, boiled	1	1	0
Flake litharge	0	0	20
Borate of manganese	0	0	14
American turps	6	0	0

Melt the rosin by heat, mix in the oil, then the litharge and manganese; keep at 500° F. until thick and stringy, then allow to cool to 300° F. and add the turps.

Cheap Liquid Drier (Terebene).

	Gallons.
"Livery" varnish	3
Turps	2
Rosin spirit	1
Sweet rosin oil	1

Liquefy the varnish in the turps at a gentle heat, remove from fire, stir in the other ingredients, then strain.

Priming for Outside Work.

Mix 14 lb. white lead, 6 pints boiled oil, ½ lb. red lead, and 4 oz. driers. When dry, the work is rubbed down with pumice stone or glass paper, and all holes stopped with putty.

Whitewash.

Take ½ bushel of good unslaked lime; slake it with boiling water; covering it during the process to keep in the steam. Strain the liquid through a sieve or strainer, and add it to a peck of salt previously dissolved in warm water, 3 lb. of ground rice, boiled to a thin paste, ½ lb. of powdered Spanish whiting, and 1 lb. of clean glue, which has been previously dissolved by soaking it well, and then hang it over a slow fire in a small kettle within a larger one filled with water. Add 5 gallons of hot water to the mixture, stir it well and let it stand for a few days covered from dust. It should be put on hot, and for this purpose it can be kept in a kettle on a portable furnace. It is said that about a pint of this mixture will cover a square yard on the outside of a house if properly applied. Fine or coarse brushes may be used, according to the neatness of the job required.

Lime Whitewash for Outside Work.

Put ½ bushel of lime into a barrel (clean and watertight), slake it with boiling water, covering it 6 inches, stir it until well slaked. Take 18 oz. common salt, and 2 lb. sulphate of zinc; dissolve them in hot water, and mix with the whitewash.

Stucco Whitewash.

Take ½ bushel of clean unslaked lime, slake it with boiling water, covering it during the process. Strain the liquor through a fine sieve or strainer, and add to it 1 peck of clean salt dissolved in warm water, 3 lb. ground rice, boiled to a thin paste, and stirred in boiling hot, ½ lb. powdered Spanish whiting, and 1 lb. clean glue which has been dissolved by soaking in hot water, then heated in a glue kettle. Add 5 gallons hot water to the whole mixture, stir it well, and let it stand a few days, covered from dirt. It should be put on quite hot; for this purpose it can be kept in a kettle on a portable furnace. About 1 pint will cover one square yard. Large or small brushes may be used according to the size of the work.

Permanent Whitewash.

Slake ½ bushel of fresh lime with boiling water, covering it to retain the steam. Strain through a fine sieve, add 7 lb. of salt previously dissolved in warm water, 7 lb. ground rice, boiled to a paste, and stirred in boiling hot, ½ lb. of powdered Spanish whiting, 1 lb.

of clean glue, previously dissolved. Add 5 gallons hot water to the mixture, stir well, then let stand a few days, protected from dust and dirt. Apply hot. A quart of this mixture will cover more than a square yard. Colouring matter may be used to produce any desired shade.

A Durable Limewash.

For one barrel of colour wash, slake ½ bushel of white lime, then add 10 lb. umber, 1 lb Venetian red, ¼ lb. lampblack, mix well together, add 3 pecks hydraulic cement, and fill the barrel with water. Let it stand twelve hours before using, and stir frequently while putting it on. This is not white, but of a light stone colour, without the unpleasant glare of white. The colour may be changed by adding more or less of the colours named, or other colours. This wash covers well, needing only one coat, and is superior to anything known excepting oil paint.

Whitewash, To Improve.

Add a strong solution of sulphate of magnesia.

A Permanent Whitewash.

Lime slaked with a solution of salt in water, and then properly thinned with skim milk from which all the cream has been taken, makes a permanent whitewash for outdoor work, and, it is said, renders wood incombustible. It is an excellent wash for preserving wood.

Whitewash Preservative.

Add 1 oz. of boracic acid to the gallon of whitewash. Salicylic acid is very good so long as the whitewash is kept off iron, and a little of it goes a long way.

Preparing Whitewashed or Kalsomined Walls for Kalsomining.

Dissolve 1 lb. of good glue, 1 lb. of bar soap, and 2 lb. of pulverised alum, each separately, in 1 quart of boiling water, first having soaked the glue. Mix the glue and the soap solution thoroughly, then add the alum solution slowly, stirring continuously. Add enough cold water to make it of the right consistency. For whitewash it should be made thinner than for kalsomine, so as to soak in deep enough to hold the whitewash.

Paper-Hangers' Paste That Will Not Dry too Rapidly in Very Dry or Hot Weather.

Beat into a smooth batter ¾ lb. ordinary starch, 6 oz. white dextrine, and 1 quart of soft cold water. Now dissolve 3 oz. of borax in 6 quarts of boiling water, and add to this hot solution 8 fluid oz. of glycerine, and while constantly stirring pour in the cold starch and dextrine batter, stirring until the mass becomes translucent. This paste will remain pliable even in a dry atmosphere, and will not crack the paper.

Preparing Kalsomine.

Dissolve 1 lb. white glue in hot water after it has been first soaked in cold water. Make a saturated solution of alum in water, then mix 25 lb. of bolted English Paris white in water to a stout paste and add to the solution, then add the liquid glue and test the mixture for its binding properties, and if it does not bind well add more glue and let it stand to cool. If the kalsomine is to be tinted, use distemper colours, that is, colours that have been ground fine in water, and which are not altered by lime, such as ochre, chrome green, ultramarine, etc., and the tinting colours should be added to whiting mixture before the glue is put in. To determine whether the tint is satisfactory, dip a piece of paper in the mixture and let it dry. When ready to apply it, thin with cold water to required consistency and use kalsomining or wall brushes. Lay your work off evenly and avoid laps. If an edge dries, stop and wet it up with a clean brush and clear water, and do the same where you have missed a spot, and finish up with kalsomine. Should your kalsomine dry too fast, slow it up with glycerine, say ¼ lb. to 2 gallons kalsomine, for in that case you have too much glue and alum, and your kalsomine is liable to crack and flake. Practise a little about your shop or your own house and you will soon determine the proper relation between pigment and binder.

Washable Distemper.

Mix 112 lb. good fine whiting, 10 gallons linseed oil, 200 lb. quicklime, best quality, slaked to cream with water and strained, 10 lb. alum and 40 lb. glue, previously dissolved in water. Thin to suitable consistence with water. This can be tinted with ochre, ultramarine, chrome green, burnt umber, etc., to any suitable tint.

Washable Distemper.

Mix 112 lb. fine Paris white, 112 lb. whiting, 10 gallons linseed oil, 20 gallons separated milk, 200 lb. quicklime slaked to thin cream with water, 10 lb. alum and 40 lb. glue dissolved in hot water.

This distemper can be tinted in any desired manner.

Washable Distemper.

	Lb.
Fine Paris white	112
Whiting	112
Quicklime, slaked	112
Casein	14
Glue	20
Alum	20
Silicate of soda	30

Mix all with suitable quantity of water to proper consistence. Tint with any pigment fast to lime.

Dry Washable Distemper.

	Lb.
Paris white	560
Zinc white	160
Fine plaster of Paris	160
White dextrine	39
Gum arabic	16
Borax	9½
Alum	5½

Finely powder and well mix together, then tint if required. Mix well and pack into 16 oz. packets or tins, etc.

Washable Distemper.

For a washable distemper take 3 lb. granular concentrated size, 1½ lb. of ground phosphate of soda, and 100 lb. Paris white, previously tinted to desired shade. Dissolve by aid of boiling water.

Washable Water-colour Paint.

Washable painting in water colours can be executed by mixing the pigments with plaster, a fusible salt, a suitable glaze, and an acidulated solution of gelatine. The paste thus formed is applied

like paint and, after it is dry, is hardened by heating the painted objects. The following proportions and methods are recommended: 10 parts of glue are dissolved in 100 parts of hot water containing a little acetic acid or other acid. After this solution has cooled it is rubbed up with 5 parts of plaster, 5 parts of soda, potash or borax, 30 parts of lead oxide or zinc white, and the necessary quantity of the water-colour pigment desired. The coating, when dry, is heated by means of alcohol or other smokeless flame. The finished coating resembles enamel. It is not affected by rain or heat and may be lacquered without difficulty.

To Make Plaster of Paris Set Slowly.

Add to the dry plaster before mixing with water from 2 to 4 per cent., by weight, of finely pulverised marshmallow root, and it will require a full hour for the mass to set hard. The mass, when dry, can be sawed, filed or turned off, and it will not shrink, crack or be brittle. If 8 per cent. of the root, by weight, is added, it will require from two to three hours to set, and the mass will be still harder when dry. When colours are added to the mass, a fine imitation of marble can be had, or if formed into tiles, they may be painted, polished or varnished.

Brown Lino Composition.

	Cwt.	Qr.	Lb.
Gloucestershire ochre	0	3	14
Red oxide	0	0	7
Umber	0	0	7
Paris white	4	0	0
Lino driers	0	0	18
Boiled linseed oil	12 gallons.		

Brown Lino, No. 2 Composition.

	Cwt.	Qr.	Lb.
Gloucestershire ochre	0	3	14
Red oxide	0	0	7
Raw umber	0	0	7
Paris white	3	0	0
Lino driers	0	0	18
Boiled oil	19 gallons.		

Red Lino, No. 1 Composition.

	Cwt.	Qr.	Lb.
Red oxide	0	3	0
Paris white	3	0	0
Lino driers	0	0	18
Boiled linseed oil	10 gallons.		

Red Lino, No. 2 Composition.

	Cwt.	Qr.	Lb.
Red oxide	0	3	0
Paris white	5	0	0
Lino driers	0	0	18
Boiled linseed oil	14 gallons.		

Indian Red Backing, No. 1, for Floorcloths.

	Cwt.	Qr.	Lb.
Indian red	0	3	14
Paris white	3	0	0
Lino driers	0	0	15
Boiled oil	10 gallons.		

Indian Red Backing, No. 2, for Floorcloths.

	Cwt.	Qr.	Lb.
Indian red	0	3	14
Paris white	5	0	0
Lino driers	0	0	20
Boiled oil	15 gallons.		

Yellow Backing for Floorcloths.

	Cwt.	Qr.	Lb.
Italian ochre	0	3	14
Paris white	3	0	0
Lino driers	0	0	18
Boiled oil	11½ gallons.		

Yellow Backing for Floorcloths.

	Cwt.	Qr.	Lb.
Italian ochre	0	3	14
Paris white	3	2	0
Lino driers	0	0	15
Boiled oil	12½ gallons.		

Floorcloth Buff Backing, No. 1.

	Cwt.	Qr.	Lb.
Italian ochre	0	3	14
White lead	0	0	14
Paris white	4	0	0
Lino driers	0	0	17
Boiled oil	12 gallons.		

Floorcloth Buff Backing, No. 2.

	Cwt.	Qr.	Lb.
Italian ochre	0	3	14
White lead	0	0	14
Paris white	5	0	0
Lino driers	0	0	18
Boiled oil	14½ gallons.		

Paint Grinding Oil.

	Cwt.	Qr.
Genuine boiled linseed oil	4	0
Raw linseed oil	1	2
Brown pine oil	1	0

Paint Grinding Oil, A Blend.

	Cwt.
Genuine boiled linseed oil	4
Brown pine oil	1

Paint Grinding Oil, B Blend.

	Cwt.
Genuine boiled linseed oil	4
Brown pine oil	2

Paint Grinding Oil, C Blend.

	Cwt.
Genuine boiled linseed oil	4
Brown pine oil	3

Paint Grinding Oil, D Blend.

	Cwt.
Genuine boiled linseed oil	4
Brown pine oil	4

Paint Grinding Oil, E Blend.

	Cwt.
Genuine boiled linseed oil	4
Brown pine oil	1
Raw linseed oil	2

Paint Grinding Oil for Pale Tints.

	Cwt.
Pale boiled linseed oil	4
Ordinary boiled oil	4
Yellow pine oil	1

Paint Grinding Oil for Pale Tints, No. 1.

	Cwt.	Qr.
Pale boiled linseed oil	4	0
Ordinary linseed oil	4	0
Yellow pine oil	2	2

Paint Grinding Oil, No. 2.

	Cwt.
Pale boiled linseed oil	4
Ordinary boiled oil	4
Yellow pine oil	3

Paint Grinding Oil for Pale Tints, No. 3.

	Cwt.
Pale boiled linseed oil	4
Ordinary boiled oil	4
Yellow pine oil	2

Paint Grinding Oil for Pale Tints, No. 4.

	Cwt.	Qr.
Pale boiled oil	4	0
Ordinary boiled oil	4	0
Yellow pine oil	2	3

Paint Grinding Oil for Pale Tints, No. 5.

	Cwt.
Pale boiled linseed oil	4
Ordinary boiled linseed oil	4
Yellow pine oil	4

Paint Grinding Oil for Pale Tints, No. 6.

	Cwt.
Pale boiled linseed oil	3
Ordinary linseed oil	4
Yellow pine oil for painting	4

Paint Grinding Oil for Pale Tints, No. 7.

	Cwt.
Pale boiled oil	3
Ordinary boiled oil	4
Yellow pine oil	5

Paint Grinding Oil for Pale Tints, No. 8.

	Cwt.
Pale boiled linseed oil	3
Ordinary boiled oil	3
Yellow pine oil	5

The compiler has given these recipes for paint grinding oils as an example of ingenuity in concocting various blends by varying the proportions of the oils. While they are cheaper than pure boiled linseed oil, yet they are not so satisfactory in use, their drying power is less in proportion to the amount of pine oil or rosin oil used.

Hard Drying Oils.

According to Andés a good hard drying oil for paints can be prepared by heating 100 parts of linseed oil to 270° C., leaving the same to settle for twenty-four to thirty-six hours and removing the sediment, then reheating with 2½ per cent. of litharge for three hours at 240° C., and setting aside to clarify. Two parts of hard Manilla copal are melted in the usual manner, and after removing the pan from the fire, 4 to 6 parts of the boiled oil, heated to 270° to 280° C., are added by degrees, heating being continued until the mixture is perfectly clear when poured on to a glass plate. After cooling, the rest of the boiled oil is added, with half part of linseed oil driers and the product stored or filtered. Another recipe consists in preparing 50 parts of wood oil by heating it to 150 to 160° C. for three hours, adding 2 per cent. of powdered litharge, and leaving it to settle for twenty-four hours, the sediment being then removed. The oil is mixed with 50 parts of prepared rosin, obtained by heating rosin along with 6 per cent. of slaked lime 7 per cent. of red lead

and 4 per cent. of manganese hydroxide, the whole being kept at 140 to 150° C. for two hours, and diluted to the proper consistency. A wood oil varnish may be obtained by heating the oil for two hours at 170° C. and leaving it to settle for two to three days, the sediment being used for putties or cheap paints. On heating this oil at 180° C. for an hour it thickens, and when cooled down to 130° C., 2 per cent. of powdered litharge is stirred in, the whole being diluted to the proper consistency. With a body colour this oil makes a good paint for floors and dries hard in five to six hours.

Process for Boiling Linseed Oil.

By the subjoined process, the oil is boiled without leaving the slightest sediment or "foots," and may be sent out as soon as it is cool enough to put into casks. For tarpaulins, floor-cloths, packing paper, or any purpose where a hard-drying, glossy oil is essential it is unsurpassed.

Preparation of Driers.

This is the first step: For each ton of oil to be boiled, take 60 lb. medium quality rosin, 17 lb. grey sugar of lead, and $3\frac{1}{2}$ lb. black oxide of manganese. The rosin should first be melted by fire-heat, and kept at a temperature of about 300° F. until all the froth (indicating the presence of moisture) has disappeared, then sprinkle in the black oxide, stirring well all the time. When the froth has subsided from that, springle in the sugar of lead, keeping on stirring well. When all your ingredients are blended together it will be found, if a few drops are placed on a piece of window glass, that it is black and opaque; with a little more stirring it will become a dark green, and, finally, when all the moisture has been evaporated, the resultant will be very little darker than the original rosin. It is advisable to keep taking samples at intervals to see how colour is progressing.

In the meantime, the oil should have been pumped or gravitated into the boiling tank, and heated up to a temperature of, say, 220° F., then start your air-pump and blow vigorously, allowing the temperature to run up to 250° F. When your driers are ready, *i.e.*, when they show bright on glass, take an equal quantity of hot oil out of your boiling tank to correspond with the weight of driers in the pan, mix with the driers, give a good stirring, and then empty whilst still hot into your boiling tank, keeping your air-pump working vigorously all the time. Unless you want a very dark oil,

temperature should not exceed 320° F. For a five-ton batch, an air-pump with a ten-inch cylinder would be ample; it should have an air-pipe delivery of 2½ inches into the oil; a 2½ inch steam coil would also be ample, and care should be taken that no joints should be allowed inside the tanks, as they are a constant source of annoyance and damage through leakage.

The following books may be consulted with advantage on subjects relating to paints, painting, etc.

Iron Corrosion, Anti-Fouling and Anti-Corrosive Paints. By Louis Edgar Andés. Price 10s. 6d. net. Scott, Greenwood & Son.

Drying Oils, Boiled Oil, and Driers. By Louis Edgar Andés. Price 12s. 6d. net. Scott, Greenwood & Son.

Manufacture of Paint. By J. Cruickshank Smith, B.Sc. Price 7s. 6d. net. Scott, Greenwood & Son.

Enamels and Enamelling. By Paul Randau. Price 10s. 6d. net. Scott, Greenwood & Son.

The Art of Enamelling on Metal. By W. Norman Brown. Price 2s. 6d. net. Scott, Greenwood & Son.

Workshop Wrinkles. By W. Norman Brown. Price 2s. 6d. net. Scott, Greenwood & Son.

House Decorating and Painting. By W. Norman Brown. Price 3s. 6d. net. Scott, Greenwood & Son.

Three Hundred Shades and How to mix Them. By A. Desaint. Price 21s. net. Scott, Greenwood & Son.

A Dictionary of Chemicals and Raw Products used in the Manufacture of Paints, etc., etc. By George H. Hurst, F.C.S. Price 7s. 6d. net. Scott, Greenwood & Son.

Students' Handbook of *Paints, Colours, Varnishes.* By J. Furnell. Price 2s. 6d. net. Scott, Greenwood & Son.

The Testing and Valuation of Raw Materials used in Paint and Colour Manufacture. By M. W. Jones, F.C.S. Price 5s. net. Scott, Greenwood & Son.

Simple Methods for Testing Painters' Materials. By A. C. Wright, M.A. (Oxon.), B.Sc. (Lond.). Price 5s. net. Scott, Greenwood & Son.

SECTION III.

VARNISHES FOR DECORATORS, COACH-BUILDERS, CABINET-MAKERS, WOOD-WORKERS, METAL-WORKERS, PHOTOGRAPHERS, ETC.

Hard White Spirit Varnish.

	Lb.
Mastic rosin	8
Sandarac rosin	16
Methylated spirit	1 gallon.
Turpentine	2 gallons.

Soft White Spirit Varnish.

	Oz.
Camphor	2
Elemi	16
Sandarac rosin	24
Methylated spirit	1 gallon.

White Hard Spirit Varnish.

	Qr.	Lb.
Pale sandarac	1	22
Pale soft Manilla	2	22
Methylated spirit	20 gallons.	

Label Varnish, Best.

	Qr.
Manilla copal	3
French rosin	3
Methylated spirit	20 gallons.

Brown Hard Spirit Varnish.

	Cwt.	Qr.
Medium rosin	0	2
Button lac	1	0
Methylated spirit	28 gallons.	

White Hard Spirit Varnish.

	Cwt.	Qr.	Lb.
Soft Manilla	1	0	0
Sandarac	0	0	14
Pale French rosin	0	1	0
Methylated spirit	25 gallons.		

Common Label Varnish.

	Cwt.	Qr.	Lb.	Oz.
Manilla copal	0	1	0	0
French rosin	1	2	0	0
Castor oil	0	0	0	3
Methylated spirit	20 gallons.			

Mahogany Varnish.

Put into 1 pint of methylated spirit of wine 2 oz. gum sandarac, 1 oz. dark shellac, ½ oz. gum benjamin, 1 oz. of Venice turpentine (genuine), and add sufficient dragon's blood (gum sang. draconis) to to give the required intensity of mahogany stain. Let it stand in a warm place, with frequent agitation, until the gums are dissolved, then strain through muslin.

Varnish Stains to Imitate Woods.

For mahogany, oak (light and dark), verdant green, dark green, rosewood, cherry, walnut and ebony, the basis varnish is to be brown hard, at, say, 2s. 10d. to 3s. per gallon; and for the lighter stains, such as satinwood, maple, and cedar, white hard varnish, at similar prices can be satisfactorily used. The colouring matters are simply spirit colours or dyes, such as spirit mahogany, oak, etc., and the following shows the approximate quantities required:—

Mahogany: Brown hard varnish, 5 gallons to 6 gallons; spirit mahogany, 8 oz. *Walnut:* Brown hard varnish, 5 gallons; spirit walnut, 7 oz. And so on for all the shades, substituting white hard varnish for brown in the case of satinwood and all the lighter varieties, using about 1 oz. to the gallon, according to the intensity of the colour required.

Finest Ebony French Polish.

	Cwt.	Qr.	Lb.
Garnet shellac	1	0	0
Gum sandarac	0	0	14
Spirit black	0	0	4
Methylated spirit	50 gallons.		

Stout Varnish.

	Qr.
Dried bleached lac	1
Dark sandarac	1
Pale French rosin	1
Methylated spirit	26 gallons.

Pale Stain Varnish.

	Qr.	Lb.
Manilla copal	3	0
Pale French rosin	1	0
Orange shellac	1	0
Benzoin	0	6
Methylated spirit	30 gallons.	

Ordinary Glaze Varnish.

	Qr.	Lb.
Dark rosin	1	20
Manilla copal	3	0
Sandarac	0	7
Methylated spirit	18 gallons.	

Finest Bookbinders' Varnish, Brown.

	Qr.	Lb.
Best button lac	1	0
Gum sandarac	0	3
Methylated spirit	10 gallons.	

Best Ebony French Bookbinders' Varnish.

	Qr.	Lb.	Oz.
Garnet shellac	1	6	0
Venice turps	0	7	0
Aniline spirit black	0	$1\frac{1}{2}$	0
Aniline Chrysoidine	0	0	2
Methylated spirit	10 gallons.		

Jet Black Cycle Enamel.

	Qr.	Lb.	Oz.
Button lac	2	4	0
Pale sandarac	0	20	0
Castor oil	0	0	½
Nigrosine black	0	3	0
Soudan G	0	0	4
Methylated spirit	20 gallons.		

Cycle Black.

	Cwt.	Qr.	Lb.	Oz.
Button shellac	0	2	0	0
Manilla copal	1	0	0	0
Medium rosin	0	3	0	0
Nigrosine black	0	0	7	0
Soudan G	0	0	0	4
Methylated spirit	45 gallons.			

Metal Varnish for Stoving at 80° F. Thirty Minutes.

	Cwt.
Dark Manilla gum	1
Dark rosin	3
Methylated spirit	100 gallons.

Can be coloured any shade with coal-tar dye.

Brown Hard Spirit Varnish.

	Qr.
Medium rosin	3
Button lac	3
Methylated spirit	28 gallons.

Red Brush Polish.

	Cwt.	Qr.	Lb.	Oz.
Garnet shellac	0	1	0	0
Dark Manilla copal	0	2	0	0
Dark rosin	1	0	14	0
Bismarck brown	0	0	0	17
Methylated spirit	25 gallons.			

Produces 34 gallons.

Fine French Polish.

	Qr.	Lb.
Pale orange shellac	2	20
Pale Manilla copal	0	10
Pale French rosin	0	10
Methylated spirit	50 gallons.	

Superior Brush Polish.

	Cwt.	Qr.	Lb.
Orange shellac	1	0	0
Sandarac	0	0	14
Chrysoidine crystals	0	0	½
Methylated spirit	25 gallons.		

Export French Polish.

	Qr.	Lb.	Oz.
Pale orange shellac	1	0	0
Common button lac	1	0	0
Gum benzoin	0	3	0
Gamboge	0	0	6
Methylated spirit	27 gallons.		

Best White French Polish.

	Cwt.	Qr.	Lb.
Bleached shellac	1	0	8
Gum sandarac	0	0	10
Methylated spirit	60 gallons.		

White French Polish.

	Qr.	Lb.
Dried bleached shellac	2	20
Pale Manilla copal	0	10
Pale French rosin	0	14
Methylated spirit	50 gallons.	

Varnish Base for Dark Tints.

	Qr.	Lb.
Garnet shellac	1	0
Dark sandarac	2	0
Medium rosin	2	0
Gum benzoin	0	7
Methylated spirit	30 gallons.	

Spirit Varnish Size for New Work.

	Qr.
Dried bleached lac	1
Dark sandarac	1
Methylated spirit	26 gallons.

Finest French Paper Polish.

	Qr.	Lb.
Gum benzoin	1	20
Pale sandarac	0	7
Methylated spirit	20 gallons.	

Clean Metal Varnish.

	Qr	Lb.	Oz.
Gum sandarac	1	0	0
Button lac	1	6	0
Venice turpentine	0	0	5
Methylated spirit	24 gallons.		

Cabinet-makers' Varnish.

Dissolve 5 lb. extra pale shellac and 7 oz. mastic in 3 quarts of methylated spirit, stir well until thoroughly mixed in a cold room. This varnish must be kept well away from heat during preparation.

Cabinet-makers' Varnish.

Take 3 pints naphtha, 3 lb. pale shellac, and 4 oz. mastic. Put them into a suitable vessel, mix and dissolve, in a cold room, by shaking and stirring.

Cabinet-makers' Varnish.

Run 7 lb. fine African gum copal, and add 2 quarts of pale clarified oil; when stringy, take the vessel into another room where there is no fire, and add 3 gallons turpentine; after this is thoroughly mixed strain through a linen cloth, it is then ready for use when cool.

Gold-coloured Varnish.

Pound 4 oz. gamboge, 4 oz. annatto, 4 oz. shellac, 4 oz. dragon's blood, and 1 oz. saffron in separate vessels; pour 1 quart of alcohol

over each, and pour into narrow-mouthed bottles or flasks and keep for five days in a warm room, shaking occasionally to hasten the solution; at the end of this period, if melted, mix the contents of the five vessels together, and stir for a short time.

White Hard Varnish.

Put 5 lb. gum sandarac, 1 lb. gum mastic and 2 gallons spirits of wine into a glass vessel to dissolve; place this in a warm corner, occasionally shaking it; when these ingredients are in a liquid condition, strain through a fine sieve.

Varnish for Gilded Articles.

Dissolve 12¼ oz. of shellac, and the same quantity of gamboge separately, in 5 pints of methylated spirit each, also dissolve 12½ oz. of annatto and the same quantity of dragon's blood, separately, in 5 pints spirit each, and then add all together. The shade may be varied by adding more or less of the annatto and dragon's blood.

Varnish for Violins, etc.

Put 12 oz. of mastic and 1 gallon of rectified spirits of wine with a pint of turpentine in a tin vessel, and place it in a warm spot, occasionally shaking, until the ingredients are thoroughly dissolved, then strain through a cloth. This varnish may be diluted if necessary with turpentine varnish.

Violin Varnish.

	Parts.
Mastic in tears	10
Dammar, soft white	5
Turps	100
Raw linseed oil	5

Violin Varnish.

Sandarac, 12 parts; shellac, 6 parts; mastic, 6 parts; alcohol, 95 per cent., 150 parts; Venice turpentine, 6 parts. Dissolve in moderate heat, then strain.

Violin Varnish.

	Parts.
Sandarac	80
Mastic	100
Elemi	30
Coloured essence	60
Castor oil	50
Methylated spirit	1,000

Watin's Formula for Violin Varnish.

	Parts.
Sandarac	125
Shellac	62
Mastic in tears	62
Venice turpentine	62
Methylated spirits	1,000
Elemi	31

Varnish for New Wood.

To varnish unpainted wood, take ½ pint wood naphtha, 8 oz. orange shellac, and ½ pint methylated spirit. Mix and dissolve. Apply it with a brush.

Varnish for Floors.

A varnish for floors which dries quickly and gives a high gloss can be obtained by melting 1 part of D. C. shellac and 2 parts of pale rosin. Draw your fire and add 6 parts of 90 per cent. methylated spirit, which has been slightly warmed, and $\frac{1}{20}$ part camphor. Every pound of this varnish will cover 35 square feet of previously primed flooring.

Jewel Varnish.

	Parts by Weight.
Shellac	90
Gamboge gum	30
Amber	30
Dragon's blood	2
Saffron	1
Sandalwood oil	2
Methylated spirit (64 overproof)	600

The rosins are rendered soluble in the usual manner, and the ordinary method for the preparation of varnishes is followed.

Gold Varnish for Metals.

	Parts by Weight.
Turpentine	24
Linseed oil varnish	12
Amber	12
Gum lac	3

Dissolve the rosin, then add the oil, finally the spirits of turpentine.

Gold Varnish for Metals.

	Parts by Weight.
Gum sandarac	50
Shellac	50
Venetian turpentine	24
Dragon's blood	6
Gamboge gum	2
Turpentine	400

This is prepared by dissolving all the solid substances in the spirits of turpentine over a water-bath.

Gold Varnish for Copper.

	Parts by Weight.
Shellac	170
Amber	60
Dragon's blood	30
Gamboge gum	5
Saffron	2
Methylated spirit	1,000

This is macerated in the spirit till the solid matter is dissolved, and then filtered.

Varnish for Polished Copper.

	Parts by Weight.
Gum sandarac	100
Rosin	30
Glycerine	5

Dissolve the gum and rosin in sufficient methylated spirit and add the glycerine.

Varnish for Steel (Dress Swords, etc.).

	Parts by Weight.
Gum sandarac	15
Small mastic	10
Elemi	5
Camphor	3

Dissolve the whole over the water-bath in sufficient methylated spirit for the purpose. This varnish is used cold. It preserves the blade from rust, and is transparent.

Yellow Varnish for White Metal.

	Parts by Weight.
Gum shellac	100
Small mastic	80
Venetian turpentine	76
Dragon's blood	45
Gamboge gum	50
Methylated spirit	1,500

Red Varnish for White Metal.

	Parts by Weight.
Shellac	20
Powdered sandarac	11
Turmeric	5
Essence of lavender	3
Red sandalwood	3
Methylated spirit	140

Reduce all these solids into very fine powder and dissolve them in the spirits of wine, either over a water-bath or over a sand-bath, the latter being preferable.

Transparent Varnish.

	Parts by Weight.
Powdered gum sandarac	4
Gum thus	7
Turpentine	23

Dissolve the gum thus and the powdered gum sandarac over a water-bath in the turpentine. Before this varnish is used, the bottle should be exposed to the sun for about an hour.

Varnish for Bottle Tops.

A solution is prepared from 25 parts of ruby shellac, 5 parts Venice turpentine, and 120 parts of methylated spirit, and coloured by adding a solution of any aniline dye in spirit. The preparation is applied by dipping the article to be coated.

White French Polish.

Dissolve 1 lb. of gum mastic and 2 lb. of gum sandarac in 3 gallons of methylated spirit, and then add 3 lb. of bleached shellac; put these ingredients in a loosely corked bottle and place in a vessel containing water and heat to a little below 174° F., until the gums are dissolved; the clear solution is then to be poured off.

White Hard Spirit Varnishes.

(1) Gum sandarac, 5 lb.; camphor, 1 oz.; methylated spirit (65 overproof), 2 gallons; mix all together, then strain; when strained add 1 quart of very pale turpentine varnish. (2) *Very fine.*—Picked mastic, 16 oz.; sandarac and pale clear Venice turpentine, of each 1½ oz.; 1 gallon methylated spirit. (3) Gum sandarac, 1 lb.; clear Strasburg turpentine, 6 oz.; methylated spirit (65 overproof), 1 quart; used on metals, etc., polishes well. (4) Sandarac, 6 oz.; elemi, 4 oz.; camphor, ½ oz.; methylated spirit, 1 quart; mix together, then strain.

Brown Hard Spirit Varnishes.

(1) Sandarac, 16 oz.; pale shellac, 8 oz.; elemi, 4 oz.; methylated spirit, 1 gallon; digest with agitation till dissolved, then add Venice turpentine, 8 oz. (2) Gum sandarac, 3 lb.; shellac, 2 lb.; methylated spirit (65 overproof), 2 gallons; dissolve, add turpentine varnish, 1 quart; agitate well and strain. (3) *Very fine.*—Shellac and yellow rosin, of each 1½ lb.; methylated spirit, 2 gallons.

Brown Hard Spirit Varnish.

Place 3 lb. of gum sandarac with 2 lb. shellac and 2 gallons of methylated spirit (64 overproof) in a flask; agitate for five hours or thereabout, strain through a cloth, and add 1 quart of turpentine varnish; agitate for about another half-hour and it will be ready for use the day following.

Varnish for Foundry Patterns and Machinery.

30 lb. of shellac and 10 lb. Manilla copal are placed in a vessel which is heated externally by steam and stirred during four to six hours, after which 20 gallons of methylated spirit are added, and the whole heated during four hours to 87° C. This liquid is dyed by the addition of orange colour and then used for painting the patterns. When used for painting and glazing machinery, it consists of 35 lb. of shellac, 5 lb. of Manilla copal, and 20 gallons spirit.

Mahogany Varnish.

Put into 1 gallon of methylated spirit of wine 1 lb. gum sandarac, 1½ lb. dark shellac, 4 oz. gum benzoin, 8 oz. of Venice turpentine, and add sufficient dragon's blood to give the required intensity of mahogany stain. Let it stand in a warm place, with frequent agitation, until the gums are dissolved, then strain through muslin.

White French Polish.

	Oz.
Gum sandarac	1
White shellac	3
Camphor	¼
Strong methylated spirit	1 pint.

Method.—Mix and let stand, well corked up, in a warm place for several days, with frequent agitation; then let settle, and pour off the clear polish for use.

Walnut Varnish.

	Gallons.
Methylated spirit	3½
Brown hard varnish	3½
Garnet polish	½
Spirit walnut	1½

Oak Varnish.

	Gallons.
Methylated spirit	1¾
White hard varnish	1¾
Brown hard varnish	2
Orange polish	2
Spirit orange	12 oz.

Satinwood Varnish.

	Gallons.
Methylated spirit	3½
White hard varnish	3½
Transparent polish	½
Spirit yellow	1½ lb.

Mahogany Varnish.

	Gallons.
Methylated spirit	3½
Brown hard varnish	3½
Garnet polish	1
Spirit mahogany	1½ lb.

Rosewood Varnish.

	Gallons.
Methylated spirit	3½
White hard varnish	1¾
Brown hard varnish	1½
Garnet polish	¾
Spirit rose	2 lb.

Maple Varnish.

	Gallons.
Methylated spirit	1¾
White hard varnish	1½
Orange polish	½
Spirit maple	12 oz.

Red Birch Varnish.

	Gallons.
Methylated spirit	3½
White hard varnish	2
Brown hard varnish	1½
Transparent polish	½
Spirit red	4 oz.

Yellow Birch Varnish.

	Gallons.
Methylated spirit	3½
White hard varnish	3
Transparent polish	½
Orange polish	½
Spirit yellow	8 oz.

Pine Varnish.

	Gallons.
White hard varnish	4
Methylated spirit	3
Transparent polish	1
Spirit yellow	6 oz.

Ebony Wood Varnish.

	Gallons.
Methylated spirit	4
White hard varnish	3¼
Brown hard varnish	5½
Spirit ebony D	2

White Wood Varnish.

	Cwt.
Soft Manilla copal	2
Pale rosin	2
Methylated spirit	100 gallons.

Patent Knotting Spirit Varnish.

	Cwt.	Qr.
Pale orange shellac	1	0
Medium rosin	0	2
Methylated spirit	28 gallons.	

Best Knotting Varnish.

	Qr.
Button lac	3
Orange lac	3
Methylated spirit	30 gallons.

Best White Patent Knotting Varnish.

	Cwt.	Qr.	Lb.
Dried bleached shellac	1	0	0
Venice turps	0	0	5
Methylated spirit	25 gallons.		

Knotting.

3 oz. of orange shellac, 2½ oz. of japanners' gold size, ½ pint of naphtha; dissolve in a warm place, and frequently shake.

To Bleach Shellac.

Dissolve 1 lb. of shellac in ½ gallon of methylated alcohol and let stand a few days in a warm place. Then prepare a mixture of ¾ lb. of chloride of lime in ¾ gallon of water, filter through linen, and wash the residuum with ½ pint of water; mix the two waters together and add an aqueous solution of soda, 2 lb. in 1 gallon, until no more precipitate falls down. Filter and add the filtrate of this process to the solution of shellac, and after half an hour sufficient hydrochloric acid is added to produce a decided acid reaction, whereupon the shellac settles out as a perfectly white mass. Same is taken out, washed in boiling water until this no longer runs off milky, and dried in the air.

Japanners' Gold Size.

To prepare japanners' gold size 1 gallon of linseed oil is boiled in a capacious pot for two hours; 11 oz. each of dry red lead and litharge and 5 oz. of copper sulphate are then gradually sifted in, while the oil is kept hot, and constantly stirred from the bottom up. When the oil has been boiling about three hours, and the driers are all in, add 2 lb. of gum animi, previously fused and mixed with 3½ pints of hot raw oil, and continue the heating and stirring for about five hours, or until it hangs in strings from the ladle, yet drops in lumps. Let the contents of the pot cool down somewhat, then mix it with 3 gallons of oil of turpentine (away from any flame or fire). This gold size ought to dry in fifteen minutes or less under favourable conditions. It improves by keeping when properly prepared.

Japanners' Gold Size.

Run 20 lb. of gum animi and mix it with 4 gallons of hot oil. In the set-pot place 10 gallons of oil and boil it well for two hours, then add 7 lb. of red lead, 7 lb. of litharge, and 3 lb. of copperas; the addition of these driers is best made in small quantities at a time, the whole mass being kept boiling all the time. When all the driers have been added the boiling should be continued for about three hours longer. Sometimes the addition of the driers causes the boiling oil to froth up very much; in such cases it is best to reduce the fire somewhat, and to take some of the oil out of the pot, adding it again as the frothing subsides. When the oil has been boiled for three hours the melted gum is added, and the boiling is continued for five hours, when it will begin to string; the boiling

is continued until the mass drops off the ladle or stirring rod in large drops and strings well. Then allow to cool, which will take about two hours, pour in, in small quantities at a time, 30 gallons of turps; as this is being poured in the whole mass must be thoroughly stirred up so as to get the turps and varnish well mixed. The mixing with the turps must not be done too quickly, or otherwise there is too great a liability to boil over; in fact this applies to the mixing of turps in making all oil varnishes. This gold size will dry in about ten minutes, if well made, although sometimes it may take twenty-five minutes to dry.

Gold Size.

Run 48 lb. of gum copal, mix with 12 gallons of oil, boil until it begins to string, then add 36 gallons of boiling oil, and thin with turps to the required consistency. This does not dry as quickly as japanners' gold size, and, as its name indicates, is used for fastening gold leaf to glass and other objects.

Finest Japan Golding.

	Cwt.	Qr.	Lb.
Pale gum kauri	0	3	0
Pale boiled oil	2	1	0
American turps	3	3	4
Flake litharge	0	0	14
Red lead	0	0	14
Copperas white	0	0	7

Pale Gold Size.

	Cwt.	Qr.	Lb.
Pale kauri gum	0	3	0
Boiled linseed oil	0	3	10
American turps	1	1	10
Litharge	0	0	7

Japan Gold Size, Ordinary.

	Cwt.	Qr.	Lb.
Dark gum kauri	0	3	0
Boiled linseed oil	0	3	10
American turps	1	1	0
Litharge	0	0	14

Black Japan Varnish.

Naples asphaltum, 50 lb.; dark gum copal, 8 lb.; fuse; add linseed oil, 12 gallons; boil; add dark gum amber, 10 lb.; previously fused and boiled with 2 gallons of linseed oil; add driers. This may be used for wood as well as metals.

Japan, Black and Flexible.

Take burnt umber, 4 oz.; asphaltum, 2 oz.; boiled oil, 2 quarts; dissolve the asphaltum first in a little oil, using moderate heat, then add the umber (ground in oil), and lastly the rest of the oil, and incorporate thoroughly. Thin with turpentine.

Benzine Japan.

	Lb.
Litharge	16
Powdered black oxide of manganese	16
	Gallons.
Linseed oil	12
Turpentine	10
Benzine	75

The entire 85 gallons of thinners may be benzine, but a small proportion of turpentine makes the reduction easier. The process of preparation is similar to those already detailed.

Iron-work Black or Cheap Brunswick Black.

	Lb.
Creosote	160
Asphaltum	56
Black rosin	44
Linseed oil substitute	2 gallons.
Rosin oil	2 gallons.

Run down the asphaltum, heating until all moisture is driven off, then run in the ground rosin and the rosin oil and linseed oil (boiling); when mixed cool down, lastly adding the creosote.

Brunswick Black.

This very useful black varnish is made in several ways. Run 45 lb. of asphaltum for six hours in a set-pot. Boil 6 gallons of oil with 6 lb. of litharge until it strings well, pour into the melted as-

phaltum and boil until it sets hard between the fingers, then allow to cool, and thin with 25 gallons of turps. This dries in about four hours, and has a good surface with a brilliant gloss.

Brunswick Black.

A cheaper Brunswick black, inferior to the last, may be made by mixing black pitch and gas tar asphaltum, of each 25 lb.; boil gently for five hours, then add linseed oil, 8 gallons; litharge and red lead, of each 10 lb.; boil as before, and thin with turpentine, 20 gallons.

Brunswick Black.

A common Brunswick black is as follows: 28 lb. of coal-tar pitch and 28 lb. of asphaltum are boiled together in the set-pot for six hours; the mixture is allowed to stand all night, after which it is boiled up and 8 gallons of boiled oil are added; 10 lb. of litharge and 10 lb. of red lead are added in small quantities at a time, and the mass boiled until it will set hard between the fingers; it is then allowed to cool, and is mixed with 20 gallons of turps. This will dry in about one to two hours, and is a good black varnish for all kinds of iron work.

Brunswick Black.

	Cwt.	Qr.	Lb.
Dark rosin	0	3	0
Common asphaltum	1	0	0
American turps	2	3	10

Brunswick Size.

Grind down 1 part of lampblack with 3 parts of best gold size, when homogeneous add 4 parts of Brunswick black, and mix thoroughly.

Super Brunswick Black.

	Cwt.	Qr.	Lb.
Best asphaltum	0	3	0
Boiled linseed oil	0	2	0
American turps	1	0	14
Flake litharge	0	0	14
Black oxide of manganese	0	0	6

Brunswick Black.

	Cwt.	Qr.	Lb.
Dark rosin	0	3	0
Common Stockholm pitch . . .	0	3	0
American turps	0	1	10
Mineral naphtha	1	3	20

Berlin Black.

	Cwt.	Qr.	Lb.
Best asphaltum	0	3	0
Boiled linseed oil	0	1	0
American turps	1	2	0
Common vegetable black . . .	0	2	14
Flake litharge	0	0	14

Black Japans.

A good black ground for japanning is prepared by grinding fine ivory black with a sufficient quantity of alcoholic shellac varnish on a stone slab with a muller until a perfectly smooth black varnish is obtained. If other colours are required the clear varnish is mixed and ground with the proper quantity of suitable pigments in a similar manner. The following are good common black grounds: (1) asphaltum, 1 lb.; balsam of copaiba, 1 lb.; turpentine, *q.s.* The asphaltum is melted over a fire, and the balsam previously heated is mixed with it. The mixture is then removed from the fire and mixed with the turpentine. (2) Moisten good lampblack with oil of turpentine and grind it very fine with a muller on a stone plate. Then add a sufficient quantity of ordinary copal varnish and rub well together. (3) Asphaltum, 3 oz.; boiled oil, 4 quarts; burnt umber 8 oz.; turpentine, *q.s.* Melt the asphaltum, stir in the oil, previously heated, then the umber, and when cold thin down with the oil of turpentine. (4) An extra black is prepared from amber, 12 oz.; asphaltum, purified, 2 oz.; boiled oil, ½ pint; rosin, 2 oz.; turpentine, 16 oz. Melt the gum, rosin and asphaltum, add the oil hot, stir well together, and when cool add the turpentine. A white ground is prepared from copal varnish and zinc white. From one to six or more coats of varnish are applied to the work in japanning, each coat being hardened in the oven before the next is put on. The last coat in coloured work is usually of clear varnish.

Black Japan.

	Cwt.	Qr.	Lb.
Medium rosin	0	3	0
Best asphaltum	1	2	20
Boiled linseed oil	1	2	0
Flake litharge	0	1	0
Black oxide of manganese	0	1	0
American turps	45 gallons.		

Black Japan.

A good quality of black japan which will dry hard and glossy is made as follows: Run 48 lb. of asphaltum in the set-pot, and when melted add 10 gallons of oil; run in the gum-pot 8 lb. of common gum animi, and mix with it 2 gallons of oil; pour the mixture into the set-pot, then run 10 lb. of common amber, and mix with 2 gallons of oil; this running is also added to the set-pot, the contents of which are boiled for three hours longer, during which time 7 lb. of red lead, 7 lb. of litharge and 3 lb. of copperas are added, and the boiling continued until the mass sets between the fingers into a hard mass. Allow it to cool, then thin with 30 gallons of turps.

Black Japan.

This is made as follows: Into the set-pot put 6 gallons of linseed oil, boil it on a slow fire for two hours, then run in a gum-pot 40 lb. of asphaltum, and mix with 8 gallons of oil, when mixed pour into the set-pot, then add 7 lb. of red lead, 7 lb. of litharge, and 3 lb. of copperas, in small quantities at a time; keep the mixture boiling slowly for four hours longer, then allow to stand till the next day, when it is boiled until a small quantity taken out on a glass will, when rubbed or rolled in the fingers, set hard; it is now allowed to cool, and when sufficiently cold 30 gallons of turps are added. If after the japan has become cold it is found to be too stiff, then it can be warmed up and more turps added until it attains the right consistency. This japan is used for all kinds of iron-work about carriages which are to be black; it dries with a hard durable lustrous coat in about eight hours.

Pure Turpentine Japan.

	Lb.
Litharge	25
Black oxide of manganese	27

	Lb.
Kauri dust	45
Well settled and aged raw oil	16 gallons.
Turpentine	80 gallons.

Common Paper Varnish.

	Cwt.	Qr.
Pale gum dammar	1	0
Palest French rosin	0	1
American turps	1	2

Pure Dammar Varnish.

	Cwt.	Qr.
Best pale gum dammar	1	1
American turps	1	2

Stout Dammar Varnish.

	Cwt.	Qr.	Lb.
Pale gum dammar	1	2	4
American turps	1	2	0

Gum Mastic Varnish.

Mastic, 2 lb.; gum sandarac, 1 lb.; turpentine, 2 oz.; linseed oil, 2 oz.; spirit, 1 gallon.

Ground Varnish for Transparencies.

Dissolve wax (white) in oil of turpentine to the required thickness.

Italian Varnish for Drawings, etc.

Dissolve 9 oz. of clear white rosin and 9 oz. of Canadian balsam with 3 pints of turpentine.

Turpentine Varnish.

Mix 7½ lb. of pounded rosin in 6 gallons of turpentine, place in a tin vessel in a warm place, shaking at intervals. When the rosin is dissolved the varnish is ready for use.

Amber Varnish.

Run 8 lb. of the palest amber, mix with 2 gallons of oil, and boil until it strings, then thin with $3\frac{1}{2}$ gallons of turps. This forms one of the most durable varnishes known; it is much used for varnishing pictures.

Amber Varnish.

Take 1 lb. of amber and 10 oz. linseed oil, heat them together in an iron vessel over a slow fire; cool, then add 1lb. turpentine. Stir well together, and it is fit for using.

Hard Church Oak Varnish.

Run 48 lb. of gum kauri, mix with 18 gallons of oil, boil until it strings well; then, after cooling, thin with $35\frac{1}{2}$ gallons of turps. This varnish dries with a hard glossy surface in from six to seven hours. It is not a durable varnish if used in positions where it is exposed to the weather, but for all interior work it stands well and resists a great deal of wear and tear.

Hard Church Oak Varnish.

	Cwt.	Qr.	Lb.
Medium kauri gum	0	1	1
Dark kauri gum	0	1	18
Boiled linseed oil	0	3	14
American turps	1	0	0

Quick Oak Varnish.

	Cwt.	Qr.	Lb.
Dark kauri gum	0	3	0
Boiled linseed oil	0	0	20
American turps	1	0	8

Quick Oak.

	Cwt.	Qr.	Lb.
Dark kauri gum	0	2	14
Medium rosin	0	0	14
Boiled linseed oil	0	0	18
American turps	1	0	0

Common Oak Varnish.

	Cwt.	Qr.	Lb.
Pale Manilla copal	0	3	0
Boiled linseed oil	1	1	8
American turps	1	1	0

Pale French Flatting Varnish.

	Cwt.	Qr.	Lb.
Pale kauri gum	0	3	0
Boiled linseed oil	0	3	0
American turps	1	0	14

Flatting Varnish.

	Cwt.	Qr.	Lb.
Dark kauri gum	0	3	0
Boiled linseed oil	0	3	0
American turps	1	0	10

Mixing Varnish.

	Cwt.	Qr.	Lb.
Dark kauri gum	0	1	14
Medium rosin	0	1	14
Boiled linseed oil	0	3	2
American turps	1	0	0

Mixing Varnish.

	Qr.	Lb.
Dark kauri	1	0
Medium rosin	2	0
Boiled linseed oil	3	2
American turps	3	20

Common Rosin Varnish.

	Cwt.	Qr.	Lb.
Medium rosin	1	3	6
Borate of manganese	0	0	13
American turps	2	0	0
Boiled oil	0	3	0

Cheap Oak Varnish.

	Gallons.
Boiled oil substitute (boiling)	20
American turps	6
Boiling clarified linseed oil	5
Ground amber rosin	60

Run down the rosin, then run in the two boiling oils, cool, thin with the turps, and strain forthwith.

Another Oak Varnish.

Dissolve 3½ lb. pale rosin into 1 gallon oil of turpentine, and stir well for a short time.

Pale Oak Varnish.

48 lb. of gum copal are run and mixed with 18 gallons of oil, ½ lb. each of dried copperas, dried sugar of lead, and litharge are added; the mixture is well boiled and thinned with 35½ gallons of turps, and the varnish is strained and finished in the usual way. This varnish is used for all kinds of best cabinet varnish; it dries in about four hours with a hard and durable surface.

Linseed Oil Varnish.

Boil 8 lb linseed oil for one hour, then add 1 lb. well powdered rosin, and stir until thoroughly dissolved; then allow to cool down and add ½ lb. of turpentine, and place aside to cool.

Oil Varnish.

Boil 36 gallons of linseed oil with 6 lb. of sugar of lead for five hours. Other driers may be used instead of the sugar of lead, such as linoleate of lead, borate of lead, and borate of manganese. Only a very small quantity of the last is required, or about 1 lb. to 70 or 80 gallons of oil.

Mahogany Varnish.

Run 8 lb. sorted gum animi, then pour into the melted gum 3 gallons hot clarified linseed oil, add ¼ lb. litharge and the same quantity of powdered dried sugar of lead; keep over the fire, occasionally stirring, until quite stringy; cool down, then thin out with 5½ gallons of turpentine, strain, and place aside to cool.

Varnish for Iron, etc.

One quart Swedish tar, 2 oz. pitch, 4 oz. asphaltum, 2 oz. black rosin, ½ oz. litharge. Grind the litharge and rosin, then put all into an iron vessel capable of holding three times the quantity, gently boil one hour, when cool thin with turpentine.

Carriage Varnish.

Run 48 lb. of second quality gum animi, mix with 12¾ gallons of oil, add ½ lb. each of litharge, dried copperas, and dried sugar of lead; boil until it strings, then thin with 35½ gallons of turps, and finish in the usual way. This varnish is used for varnishing dark-coloured carriages, the iron-work of coaches, and for ordinary cabinet-work. It dries quickly, in about four hours in summer and five hours in winter, with a hard and glossy surface.

Elastic Hard Carriage Varnish.

Run 48 lb. of gum copal, mix with 12 gallons of oil, add 2 lb. of dried sugar of lead, and boil until stringy; thin with 30 gallons of turps. Run 48 lb. of gum animi, mix with 12 gallons of oil, add 2 lb. of dried copperas, and boil until it strings; thin with 23½ gallons of turps. Both runnings are mixed together and finished in the usual way. This varnish is used for the under coats in varnishing carriages; dries hard in about five to six hours, and gives a smooth surface.

Elastic Carriage Varnish.

Run 48 lb. of first quality gum copal, mix with 18 gallons of oil, boil for four hours until it strings; then, after cooling, add 35½ gallons of turps. Run 48 lb. of best gum animi, mix with 12 gallons of oil, and, after boiling until it strings, thin with 23½ gallons of turps.

Two pots of this running are mixed with one pot of the first running, and the whole is strained and allowed to mature. This varnish is much used as the finishing varnish for common coaches, and for the under parts of superior coaches. It dries brilliant and is durable, taking about ten hours in summer and twelve hours in winter to dry.

Elastic Carriage Varnish.

Run 48 lb. of good quality gum copal, mix with 12½ gallons of oil, add ¾ lb. of litharge; boil until it strings, then allow to cool and thin

with 35½ gallons of turps. Run 48 lb. of second sort gum animi, mix with 12½ gallons of oil, add ¾ lb. of dried sugar of lead, and 2 lb. of litharge; boil until it strings, allow to cool and thin with 35½ gallons of turps. The two lots are mixed together, strained, and allowed to mature. This varnish dries hard with a fine polish in about five hours in summer and seven hours in winter.

Elastic Carriage Varnish.

	Cwt.	Qr.	Lb.
Dark kauri gum	0	1	24
Pale kauri gum	0	1	14
Boiled linseed oil	1	2	11
American turps	1	0	19

Hard Drying or Flatting Varnish.

This is made by running 48 lb. of gum animi, mixing with 12 gallons of oil, and, after boiling for four hours, thinning with 23½ gallons of turps.

Pale Copal Varnish.

Carefully select 48 lb. of the palest gum copal, run well and mix with 12 gallons of pale boiled oil, boil the whole until it strings, then allow to cool down a little, and thin with 35½ gallons of turps; strain and finish as usual. When well made this varnish is very pale, and dries with a lustrous, durable coat in from eight to ten hours.

Quick-drying Copal Varnishes.

(1) Turpentine, 1 pint; alcohol ½ pint; mix, and add slowly under stirring powdered copal 4 oz. Place on warm bath at 100° and when dissolved leave the mass to settle, then drain off and decant. (2) Powdered copal 18 oz.; turpentine 3 pints; copaiba balsalm, 3 oz.; alcohol 1 pint. Proceed as in formula 1.

Finishing Body Varnish for Coaches.

Run 48 lb. of best African animi, pour in 12 gallons of the best linseed oil, well boiled; set very slowly (by boiling for four to five hours until it strings well), allow to cool and add 21½ gallons of turps; strain and allow to age. This varnish is considered to be the best

varnish made, but it requires considerable care in making to obtain it of good quality; the best and palest gum and the best oil must be used.

Hard Carriage Varnish.

	Cwt.	Qr.	Lb.
Best pale kauri gum	0	1	24
Dark kauri gum	0	1	14
Pale rosin	0	0	14
Boiled linseed oil	0	3	16
American turps	1	0	5

Best Coating Body Varnish.

	Cwt.	Qr.	Lb.
Best pale kauri gum	0	3	0
Boiled linseed oil	0	3	10
American turps	1	0	1

Pale Hard Drying Body Varnish.

	Cwt.	Qr.	Lb.
Best pale kauri gum	0	3	0
Boiled linseed oil	0	3	10
American turps	1	0	1

Quick Carriage Varnish.

	Cwt.	Qr.	Lb.
Boiled linseed oil	0	0	20
Best pale kauri gum	0	3	0
American turps	1	0	8

Hard Body Varnish.

	Cwt.	Qr.	Lb.
Best pale copal	0	3	0
Boiled linseed oil	0	3	10
American turps	1	0	1

Finishing Body Vanrish.

	Qr.	Lb.
Dark kauri gum	1	14
Pale kauri gum	1	14
Boiled linseed oil	3	10
American turps	3	25

Quick Carriage Varnish.

	Cwt.	Qr.	Lb.
Best pale kauri gum	0	0	14
Dark kauri gum	0	0	14
Boiled linseed oil	0	0	20
American turps	1	0	8

Carriage and Body Varnish.

Preparation 1.—Finest African copal, 14 lb.; fuse carefully, add clarified hot linseed oil, 16 gallons; boil gently for four and a half hours, or till quite stringy, cool a little and thin with turpentine, 26 gallons. Dries slowly.

Preparation 2.—Pale gum copal, 64 lb.; clarified hot linseed oil, 16 gallons; mix while still hot with the following varnish: pale gum animi, 64 lb.; hot linseed oil, 16 gallons; dried white copperas, 1½ lb.; boil as before, and thin with turpentine, 2 gallons.

Common Rosin Varnish.

Preparation 1.—Clear pale rosin, 3½ lb.; turpentine, 1 gallon; dissolve.

Preparation 2.—Clear Venice turpentine, 4 lb.; turpentine, 5 lb.; mix.

Both are good common varnishes for wood or metal.

Cheap Oil Varnish.

Preparation 1.—Rosin, 24 lb.; melt by heat, add Venice turpentine, 10 lb.; pale drying oil, 8 gallons; cool a little, and thin with turpentine, 8 quarts.

Preparation 2.—Rosin, 42 lb.; boiled oil, 4 gallons; melt and thin with turpentine, 16 quarts.

Both the above are good varnishes for common work.

Oak Varnish.

	Cwt.	Qr.	Lb.
Dark kauri gum	0	3	10
Boiled linseed oil	1	1	4
American turps	1	1	0

Crystal Varnish.

The best crystal varnish is made with Canada balsam and sufficent turpentine to make the varnish of a proper consistence for the purpose for which it is required. A very good crystal varnish may, however, be made with gum mastic, 2½ lb.; gum dammar, 1 lb.; turpentine, 1 gallon.

Crystal Varnish.

Preparation 1.—Genuine pale Canada balsam and rectified oil of turpentine, equal parts; mix; place the bottle in warm water, agitate well, set it aside in a moderately warm place, and in a week pour off the clear liquor. This is used for maps, prints, drawings, and other articles of paper, and also to prepare tracing paper and to transfer engravings.

Preparation 2.—Mastic, 3 oz.; methylated spirit, 1 pint; dissolve. Used to fix pencil drawings.

Lacquer for Dark Wall-paper.

Wall-paper coated with the following lacquer can be washed with soap and water without suffering injury:—borax 1 oz.; shellac or stick lac. 1 oz., all dissolved in 10 oz. of hot water. The solution is strained through a close cloth, and the lacquer is applied to the wall-paper either before or after it is put upon the wall. When dry the paper is brushed with a soft brush, which will give it a fine lustre. The paper should receive two coats, which are applied in the usual manner with a brush, but of course the first coat should be thoroughly dry before the second is laid on.

Gold Colour Varnish.

Take 2 oz. white shellac, 2 oz. dragon's blood, 2 oz. gamboge, 2 oz. annatto, and ½ oz. saffron. Pound these separately, then put them into a bottle with 1 pint spirits of wine; place the bottle in a warm place for two or three days, shaking and stirring until dissolved.

Cheap Gold Varnish.

Mix 1 quart of turpentine varnish, 2 oz. gamboge, 3 pints turpentine, ½ gill asphaltum, ½ oz. yellow aniline, and 1 oz. of umber. This is used in place of expensive gold varnish on tin goods.

Varnish for Writing on Glass.

Ether, 50 oz.; sandarac, 3 oz.; mastic, 3 oz; dissolve, then add benzine in small quantities till the varnish, spread on a piece of glass, gives it the aspect of ground glass. The varnish is used cold. With ink or lead pencil, lines can be produced on this surface as fine as may be desired. Thus a drawing may be prepared in a few minutes and immediately projected in a magic lantern.

Varnish for Glass.

Dissolve a quantity of gum tragacanth (powdered) in the white of an egg, well beaten up, and leave for twenty-four hours; it is then ready for use.

Mastic Varnish.

This may be made with strong spirit, but turpentine is the more common solvent, in the proportion of 1 gallon to 3 lb. fine picked mastic. To make good mastic varnish care is required in every part of the process—in picking the gum, in dissolving it, and, above all, in clarifying it. The longer mastic varnish is kept the better it becomes, as it becomes tougher and less apt to chill or bloom. It matures in from six to twelve months.

Mastic Varnish.

Preparation 1 (fine).—Very pale and picked gum mastic 5 lb.; rectified turpentine, 2 gallons. Put them into a clean 4 gallon stone or tin bottle, cork securely, and keep rolling it backwards and forwards pretty smartly on a counter or any other solid place for at least four hours, then, if the gum is all dissolved, the varnish may be decanted, strained through muslin into another bottle and allowed to settle. It should be kept for six or nine months before use, as it thereby gets both tougher and clearer.

Preparation 2 (second quality).—Mastic, 8 lb.; turpentine, 4 gallons; dissolve by a gentle heat, and add pale turpentine varnish, ½ gallon.

Preparation 3.—Gum mastic, 6 oz.; turpentine, 1 quart; dissolve. Mastic varnish is used for pictures, etc. When good it is tough, hard brilliant and colourless. Should it get chilled, 1 lb. well-washed siliceous sand should be made moderately hot and added to each gallon, which must then be well agitated for five minutes, and afterwards allowed to settle.

Mastic Varnish.

	Oz.
Mastic	1
Sandarac	½
Methylated spirit	10

This is a somewhat soft varnish, but is of a pale colour.

Dipping Solution for Bronzing Paint Tins.

Dissolve asphaltum in spirits of turpentine, and thin down to tl requisite consistency.

Blackboard Varnish.

Take 5 oz. of best white shellac, and put it into a bottle with 1 pint spirits of wine; when dissolved, put in sufficient gas black to make the whole dense. Clean the board, and apply a coat with a soft brush. When dry, give another coat until you have the desired effect. The chalk will rub clean out and leave no marks.

Varnish for Charts, Drawings, etc.

Boil a quantity of clean parchment cuttings with water in a glazed earthen vessel until it gives the appearance of a very clear size, then place aside for use.

Varnishes for Drawing Crayons.

(1) Sandarac 10 parts, alcohol (95°) 90 parts; (2) gum dammar 10 parts, alcohol 90 parts; (3) white gum lac 5 parts, Venice turpentine 5 parts, alcohol 90 parts; (4) Caoutchouc 2 parts, sandarac 8, oil of turpentine 45, benzol 45 parts; (5) gutta-percha 2 parts, white gum lac 8, benzol 40, oil of turpentine 45 parts; (6) gutta-percha 3 parts, copal 7, raw linseed oil 10, oil of turpentine 80 parts; (7) caoutchouc 1 part, dammar 35, chloroform 6, benzine 250, a little sodium silicate being added to neutralise the acidity of the resin; (8) an ammoniacal solution of casein, containing 10 per cent. of calcium tannate.

Varnish for Plaster Casts.

Grate 1 oz. of curd soap and dissolve in 4 lb. of water in an enamelled vessel over a slow heat, then add 1 oz. finely cut white beeswax, and when these ingredients are thoroughly combined the varnish is fit for use.

Transfer Varnish.

Mastic in tears, 6½ oz.; rosin 12½ oz.; pale Venice turpentine and sandarac, of each 25 oz.; methylated spirit, 5 pints; dissolve as before. Used for fixing engravings or lithographs on wood, and for gilding, silvering, etc.

Engravers' Transfer Varnish.

Dissolve together 12½ oz. each of mastic (broken), and 25 oz. each of sandarac and pale Venetian turpentine; add 1 quart turpentine varnish, and strain through a linen cloth.

Engravers' Stopping-out Varnish.

Mix lampblack with a sufficient quantity of turpentine and a little Venice turpentine to a paste consistency.

Borax Varnish.

10 lb. of borax, 30 lb. of coarsely pulverised shellac, and 20 gallons of water. Dissolve by warming on a steam-bath for a few hours. When cold it may be filtered. To make it more pliable, add a few drops of glycerine. It may be given various colours by introducing aniline dyes; for a black varnish it is recommended to use Soluble Nigrosine; red varnishes are obtained by adding Eosine or Magenta; for blue, either Methylene blue, Alkali blue or Marine blue; for green, Malachite green or Brilliant green, and for violet, Methyl violet. Of these from 1 to 2 lb. per gallon will be usually sufficient. The black borax varnish coloured with logwood, etc., is used for polishing ladies' boots and shoes, being cheaper than alcoholic varnishes.

Water Stain Varnish

	Lb.
Bleached shellac	14
Lump borax	7
Water	70 gallons.

Process.—Boil together until all is dissolved, strain and keep in clean turps barrel.

Dead Surface Varnishes.

Generally speaking, such varnishes are produced by preparing mixtures of solutions of rosins with liquids in which they are insoluble. For example, a solution of gum sandarac in ether, when mixed with one-fourth as much benzol, gives an excellent imitation of ground glass, so does one of gum dammar in benzol when mixed with ether, which renders it semi-opaque. A mixture of benzol with common negative varnish used by photographers gives a beautiful dead surface.

The proper proportions to be recommended are about as follows: say 10 parts of sandarac dissolved in 43 parts of ether, to which is added 34 parts of benzol.

Black Varnish for Iron.

A cheap black paint or varnish for iron-work is prepared as follows: Clear wood tar, 10 lb.; lampblack or mineral black, 1½ lb.; turpentine, 5½ quarts. The tar is first heated in a large iron pot to boiling, or nearly so, and the heat is continued for about four hours. The pot is then removed from the fire out of doors, and while still warm (not hot) the turpentine mixed with the black stirred in. If the varnish is too thick to dry quickly, add more turpentine. Benzine can be used instead of turpentine, but the results are not so good. Asphaltum is preferable to cheap tar.

Copal Picture Varnish.

Run 8 lb. of the very best and palest copal, mix with 3 gallons of oil, and boil until it strings well, then thin with 3 gallons of turps. When good materials are used a pale durable varnish is obtained.

Black Varnish for Carriage Iron-work.

Run 48 lb. of asphaltum in the set-pot, and add 10 gallons of boiled oil, 7 lb. of red lead, 7 lb. of litharge, and 3 lb. of copperas; run 8 lb. of copal, mix with 2 gallons of oil, and add to the set-pot, and then boil until it sets hard between the fingers; then, after cooling, thin with 30 gallons of turps. This dries hard with a good surface in about three hours.

Coachmakers' Black Japan.

	Cwt.	Qr.	Lb.
Amber gum	1	1	20
Ground black rosin	0	0	40
Linseed oil	14	gallons.	
Boiling clarified oil	10	gallons.	
Asphalt varnish	10	gallons.	

Fuse amber, then add the rosin and the boiling oil; cool, add asphalt varnish, then thin out with the linseed oil.

Coachmakers' Black Varnish or Japan.

	Lb.
Amber gum	160
Asphaltum	40
Black rosin	40
American turps	15 gallons.
Well clarified raw linseed oil	10 gallons.
Rosin spirit	5 gallons.

Melt the amber at 360° F., add the oil which should be ready boiling; then turn in asphaltum and rosin, continue boiling until all moisture is out of asphaltum; then turn out fire and allow varnish to cool down. Thin with the turps and rosin spirit, first blended together.

Varnish for Labels.

Write the labels in large-size letters or else use printed labels; when quite dry and stuck on the bottle, give them a coating of a 20 gr. solution of gelatine, going about $\frac{1}{8}$ of an inch beyond the label on to the glass. Allow to dry thoroughly and varnish with ordinary white hard varnish, or with:—

	Oz.	Gr.	Min.
Mastic	0	90	0
Oil of lavender	0	0	15
Alcohol	1	0	0
Benzol	$\frac{1}{4}$	0	0

Imitation Shellac Varnish.

Take 4 lb. of pulverised silica or china-clay, the former being the better, and stir into it a quart of good japan liquid driers, and beat the mass into a perfect mixture. Then add, while stirring,

the mass briskly, 1½ gallons of best hard oil finish or other equally good varnish; after which let the mass stand an hour or so; then strain through a fine sieve. Thin with turpentine or benzine. Use it very thin for soft wood, and heavier for hard wood.

Aqueous Shellac Varnish.

	Oz.	Gr.	Dr.
Bleached shellac	1	0	0
Borax	½	0	0
Sodium carbonate	0	60	0
Water	10	0	0
Glycerine	0	0	1

Dissolve the borax and soda in 3 parts of the water and add the shellac.

Matt Varnish.

	Oz.	Gr.
Sandarac	0	360
Mastic	0	48
Ether	10	0

Dissolve and add :—

Benzol	3 to 4

The more benzol is added the coarser the grain.

To Remove Varnish.

When it is necessary to remove varnish, a mixture of strong solution of ammonia, 1 part, with methylated spirit, 9 parts, should be allowed to soak into the film for five minutes, and then gentle rubbing with a tuft of cotton-wool will generally remove the varnish, or the treatment may be repeated. This will remove nearly all varnishes except the celluloid varieties, which can be removed with amyl acetate.

Lacquers for Brass Castings.

	Oz.	Gr.
Shellac	6	0
Manilla copal	2	0
Dragon's blood	0	40
Extract red sandalwood	0	30

	Oz.	Gr.
Oriental saffron	0	36
Methylated spirit	44	0

Expose articles to a gentle heat and dip in the lacquer several times if necessary. Has a good colour, is durable, and may be cleaned with water and a dry rag.

Lacquer for Brass or Bronze.

	Oz.
Shellac	16
Dragon's blood	4
Turmeric root	1
Alcohol	332

Warm the articles before applying.

Black Lacquer.

	Oz.
Shellac	9
Methylated spirit	50

Digest, and then add :—

Asphaltum	10

Dissolve in :—

Benzol	50
Lampblack	*ad lib.*

Dilute with alcohol and benzol to proper consistence.

Red Spirit Lacquer.

2 gallons methylated spirit, 1 lb. of dragon's blood, 3 lb. of Spanish annatto, and 3¼ lb. of gum sandarac. Shake well, dissolve and strain, and then add 2 pints of turpentine; mix well.

Varnish for Gilded Articles.

Shellac, gamboge, dragon's blood, annatto, each 4 parts; saffron, 1 part. Dissolve each rosin separately in 8 parts of methylated spirit, and make tinctures with the dragon's blood and annatto, each in 8 parts of methylated spirit, then mix the gum solutions together and add a sufficient quantity of the tinctures to give the required shade and colour to the varnish.

Finest Bronze Lacquer.

	Lb.
Button lac	24
Sandarac	14
Aloes	7
Gum accroides	10
Gamboge	6
Methylated spirit	45 gallons.

Filter through paper.

Green or Steel Lacquer.

	Qr.	Lb.
Button lac	1	0
Turmeric	0	6
Sandarac	0	6
Gamboge	0	1½
Methylated spirit	20 gallons.	

Spirit Lacquer Cold.

	Qr.	Lb.
Sandarac	1	0
Button lac	0	14
Benzoin	0	4
Methylated spirit	16 gallons.	

Coloured with aniline dyes according to shade required. This is used cold by dipping the articles in the lacquer and stoving at an ordinary temperature.

Dipping Lacquers without Stoving.

Dipping lacquers require a large proportion of drying oils to the hard rosins used, notwithstanding which, stoving is usually necessary to make them dry hard. This, indeed, is essential where the articles lacquer are subjected to heavy wear, such as parts for cycles, motor cars, sewing machines, etc.; but for other articles the stoving may be omitted if a suitable lacquer be used. Such a lacquer can be prepared, for example of—Cuba asphaltum 7½ parts, Gilsonite 7½, prepared wood oil 20, manganese resinate ½, lead linoleate ½, oil of turpentine 6, and heavy benzine 14 parts. The asphaltum is melted with the Gilsonite, and boiled up with the wood oil, the driers being dissolved after cooling and the turps and benzine added afterwards. This lacquer is used for dipping iron bedsteads, and does not require

stoving; and it is also suitable for re-enamelling cycles. A white lacquer for the same purpose can be prepared as follows; and coloured as desired by the incorporation of ground pigments: best pale French rosin 12½ parts, 10 parts of lacquer varnish, 12½ parts of oil of turpentine, and 35 parts of best zinc white are mixed together, the rosin and varnish being heated and stirred until the former is dissolved. After cooling, the turps is added, and the lacquer is left to settle, the zinc white being then added, and the whole put through the mill twice. A stamping lacquer which will dry quickly without stoving, and will bear stamping without cracking, can be made of 6 parts of kauri gum, 15 parts of prepared wood oil, ¼ part of manganese oleate, ¼ part of lead linoleate, 3 parts of oil of turpentine and 6 parts of heavy benzine. The same recipe will furnish a gold stamping lacquer on the addition of a solution of 4 parts of refined stearine pitch in 4 parts of oil of turpentine. All these preparations will stand washing, and they do not rub off or crack.

Stoving Brass Lacquer.

	Lb.
Bleached lac	24
Aloes	4
Gamboge	2½
Sandarac	6
Methylated spirit	35 gallons.

Best Brass-finishers Lacquer, Silver.

	Qr.	Lb.
Bleached lac	1	0
Sandarac	0	6
Venice turps	0	5
Methylated spirit	25 gallons.	

Steel Lacquer.

	Qr.	Lb.
Button lac	2	0
Manilla copal	0	7
Medium rosin	0	4
Turmeric	0	12
Methylated spirit	21 gallons.	

Common Transparent Lacquer.

	Cwt.	Qr.	Lb.	Oz.
French rosin	1	1	0	0
Castor oil	0	0	0	7
Methylated spirit	20 gallons.			

Pale Tanners' Lacquer.

	Cwt.	Qr.
Gum sandarac	0	1
French rosin	1	0
Methylated spirit	20 gallons.	

Lacquers for Brass.

Shellac, dragon's blood, annatto and gamboge, each 4 oz.; saffron, 1 oz.; spirit, 10 pints.

Turmeric, 1 lb.; annatto, 2 oz.; shellac and gum juniper, each 12 oz.; spirit 12 oz.

Shellac, 6 oz.; dragon's blood, 40 gr.; extract of red sanders, ½ dram; Oriental saffron, 36 gr.; methylated spirit 40 oz.

Shellac, 3 oz.; gamboge, 2 oz.; extract of red sanders, ½ dram; dragon's blood, 1 dram; saffron, ½ dram; spirit, 2 pints 4 oz.

Turmeric, 6 drams; saffron, 15 gr.; methylated spirit, 1 pint. After straining, add gamboge, 6 drams; gum sandarac and elemi, each 2 oz.; dragon's blood and shellac, each 1 oz.

Methylated spirit, 1 pint; turmeric, 1 oz.; annatto and saffron, 2 drams each; agitate frequently for a week, filter into a clean bottle, and add shellac, 3 oz. Let stand, with occasional agitation, for about two weeks.

Gamboge, ½ oz.; aloes, 1½ oz.; shellac (fine), 8 oz.; spirit 1 gallon.

Bronzing Liquid.

Dissolve 10 parts magenta and 5 parts of aniline purple in 100 parts of 95 per cent. methylated spirit on a water-bath; after solution has taken place, add five parts of benzoic acid and keep the whole boiling for five or ten minutes, until the green colour of the mixture has given place to a fine light bronze brown. This liquid may be applied to all metals as well as many other substances, yields a very brilliant coating, and dries quickly. It is applied with a brush

Metal Lacquer.

To obtain a light, hard, and cheap varnish for metal wares, dammar can be usefully employed. With 2 lb. dammar, 1 gallon turpentine, and 2 lb. linseed oil varnish a very good lacquer is obtained, which on sheet metal shows a light colour with yellowish shade. Paper is rendered transparent by this lacquer. It dries slowly, and is transparent, soft and pliable. This lacquer can be coloured a fine red or brown yellow to gold colour by the addition of dragon's blood and asphalt.

Pale Gold Lacquer.

For a pale gold lacquer use orange shellac, 2 lb.; turmeric, 1 lb.; methylated spirit, 64 o.p., 1 gallon. For a dark gold lacquer replace the turmeric by dragon's blood.

Stoving Gold Lacquer.

	Qr.	Lb.
Button lac	1	0
Gamboge	0	$\frac{1}{2}$
Dragon's blood	0	3
Sandarac	0	6
Methylated spirit	30 gallons.	

Lacquer for Articles of Tinplate.

	Oz.
Turmeric	$3\frac{3}{4}$
Saffron	10
Sandarac rosin	$3\frac{3}{4}$
Canada balsam	2
Mastic rosin	2
Methylated spirit	60 fl. oz.
Turpentine	10 drams.

Digest the turmeric and saffron in the spirit for several days, then filter, and in the filtered fluid dissolve the rosin and balsam and finally add the turpentine.

Transparent Lacquer for Steel.

	Oz.
Mastic rosin	8
Camphor	

	Oz.
Sandarac rosin	12
Elemi rosin	4
Methylated spirit	*q.s.*

Dissolve the solids in the spirit and use the lacquer cold.

Lacquer for Zinc.

	Oz.
Gamboge	3
Shellac	8
Annatto	3
Seed lac	9
Methylated spirit	60
Venice turpentine	$\frac{3}{4}$
Dragon's blood	$\frac{3}{4}$
Methylated spirit	5 gills.

Digest the gamboge and annatto in the 5 gills of spirit, dissol the shellac in the 60 fl. oz. of spirit, and when dissolved add t Venice turpentine and dragon's blood and put in a warm place 1 a few days.

Varnish for Photographic Plates.

	Oz.
Sandarac	60
Chloroform	45
Essence of lavender	2
96 per cent. spirit	300

Varnish for Retouching Photograph Negatives.

	Oz.	Gr.
Dammar	0	160
Gutta-percha	0	20
Benzol	10	0

Dissolve and rub on with the finger.

Cold Varnish for Photograph Negatives.

	Oz.
Commercial white hard varnish	10
Liquid ammonia ·880	*q.s.*

Add sufficient ammonia to redissolve the precipitate first formed and then add :—

Distilled water	$2\frac{1}{2}$ oz.

This can be applied with a brush.

Photograph Negative Varnish.

	Lb.	Oz.
Sandarac	1	0
Shellac	$\frac{1}{2}$	0
Castor oil	0	3
Methylated spirit	2 gallons.	

Wax and Bitumen Varnish for Etched Steel Plates.

	Oz.
Yellow wax	3
Pure Judæa bitumen	15
Benzol	300

Filter, allow to stand, and decant.

Varnish for Etched Steel Plates.

	Oz.
Yellow wax	125
Petroleum	25
Benzol	3

Etching Varnish.

Dissolve $\frac{1}{2}$ oz. Burgundy pitch, $\frac{1}{2}$ oz. of black and 2 oz. of white wax together, adding slowly 2 oz. of powdered asphaltum. Boil until a drop taken out, when cold, can be broken by bending to and fro two or three times. Then pour into lukewarm water, and make into balls for use.

Varnish for Tinfoil.

Two hundred parts by weight of shellac are dissolved in about 700 parts of spirit, and filtered, the scum on the filter being allowed to drain, and a glass plate being used to cover the filter to prevent waste of the spirit by evaporation. This shellac varnish is incorporated, by stirring with 100 parts of best white elemi rosin and 25 parts of Venice turpentine in the warm. After filtration, the elemi

rosin left on the filter is pressed and returned to the filtrate. The resulting varnish can be strained, in the same way as the brilliant lacquers.

White Japan for Reflectors.

A white paint for lamp reflectors, which has a fine porcelain finish and needs no heating, is made as follows: Mix pure white zinc (dry) with sufficient silicate of soda to be easily applied with a brush. Apply one coat, and dry by artificial heat, if convenient; then apply a second heavy coat, and dry either in an oven at from 150° to 200° F., or at ordinary temperature.

White Dammar Varnish for Enamel Paints.

	Lb.
Batavian dammar	130
White rosin (W.W. or W.G.)	15
Sulphate of zinc	14
Turpentine	12
Benzine	10

Melt the gum and the rosin with the zinc in a copper kettle until solution is complete. Add the turpentine gradually after the kettle is taken off the fire. Then reduce with the benzine. This product may be used as a varnish, grinding with enamel colours, or as a white varnish pure and simple. It dries much harder than ordinary dammar varnishes.

Varnishes for Pencil Drawings.

(1) Sandarac 10 parts, alcohol (95 per cent.) 90 parts. (2) Gum dammar, 10 parts, alcohol 90 parts. (3) White gum lac 5 parts, Venice turpentine 5 parts, alcohol 90 parts. (4) Caoutchouc 2 parts, sandarac 8 parts, oil of turpentine 45 parts, benzol, 45 parts. (5) Gutta-percha 2 parts, white gum lac 8 parts, benzol 40 parts, oil of turpentine 50 parts. (6) Gutta-percha 3 parts, copal 7 parts, boiled linseed oil 10 parts, oil of turpentine 80 parts. (7) Caoutchouc 1 part, dammar 35 parts, chloroform 6 parts, benzine 250 parts, a little sodium silicate being added to neutralise the acidity of the rosins. (8) An ammoniacal solution of casein containing about 10 per cent. of calcium tannate.

Celluloid Varnishes.

These varnishes are prepared by dissolving colourless celluloid in a mixture of strong spirit and ether. The price of celluloid being

high, a cheaper way of preparing these varnishes is proposed, and consists in dissolving absolutely dry gun cotton in a mixture of three or four times its weight of ether with from three to six times its weight of very strong spirit. After standing a few days, the solution is separated from a small quantity of an insoluble sediment, and a quantity of camphor, amounting to from 25 to 30 per cent. of the original weight of the gun cotton, is added to it.

Celluloid Varnish.

	Oz.	Gr.
Pyroxyline or celluloid	0	50
Amyl acetate	7	0
Amylic alcohol	7	0

Dissolve. This can be applied cold, but it takes some time to dry.

Collodion.

	Fl. Oz.	Gr.
Ether, s.g. ·725	10	0
Alcohol s.g. ·805	8	0
Pyroxyline	0	120

Collodion Varnish.

Amyl acetate, 4 gallons; benzol, 4 gallons; acetone, 2 gallons; pyroxyline, 2½ lb. The different ingredients are mixed and the pyroxyline dissolved therein.

These celluloid and collodion varnishes are excellent for gold, silver, bronze and aluminium paints by the simple addition of the requisite metallic powders. By colouring with the spirit soluble coal-tar dyes they make good coloured varnishes.

Asphaltum Varnish for Wooden Vessels.

Two hundred parts of asphaltum are dissolved in 900-1000 parts of turps at moderate heat, and followed by 100 parts of elemi, 100 of yellow wax, and 100 of Venice turpentine, the whole being gently boiled for a quarter to half an hour, and strained through a cloth when cold.

Varnish for Rubber Shoes.

Hard rosin 5 parts, shoemaker's pitch 15, Syrian asphaltum 15, coal tar 5, benzol 50, benzine 10 parts. The rosin, pitch, tar,

and asphaltum are placed in a rolling cask, the benzol is poured over them, and the cask is rolled until all is dissolved, whereupon the varnish is thinned down with the benzine. Owing to the difficulty of straining the product, care should be exercised in selecting materials free from impurities, otherwise the varnish will have to be left for some time to settle.

Varnish for Paper.

Digest well together in a closed vessel 1 part dammar rosin, and 6 parts acetone for twelve days, then pour off the clear. To this add 4 parts collodion, mix together, then let it stand until clear. This varnish is waterproof.

Coloured Varnish for Straw Hats.

A stock varnish is prepared from sandarac 35 parts, elemi rosin 54, pine rosin 45, castor oil 11, and methylated spirit 850 parts. The crushed rosins are suffused with the spirit in a suitable vessel, and left to dissolve, being shaken at intervals, the castor oil being added last of all. From this stock varnish different coloured varnishes can be prepared by the addition of about 1 per cent. of aniline dye, aniline yellow, Bismarck brown and ivory black being the most suitable.

French Enamel Varnish.

	Lb.	Oz.
Amyl acetate	24	0
Acetone	5½	0
Methylated spirit	4	0
Celluloid chips	2	6

Chinese Wood Oil Varnishes.

Manganese resinate when boiled with the oil in generous proportion gives very satisfactory results in preventing flatting and crawling. The following formula will be found to give a very fine wearing varnish of good colour at a very low cost: 250 pints of China wood oil, heat to 200° C., allowing no increase above this temperature. Add 8 pints manganese resinate, fused and boiled to desired consistency at 200° C. Add 80 pints ordinary rosin fused with the requisite amount of lime. When cooled at 125° C. add 250 pints of benzine.

A much cheaper varnish may be produced by the following formula: 250 pints of China wood oil, 8 pints manganese resinate, 400 pints ordinary rosin fused lime, 450 pints benzine; treat as before.

An excellent grinding japan may be made as follows: 250 pints of China wood oil heated to 200° C. Add 20 pints manganese resinate, and heat at 200° C. to the desired consistency. Add 100 pints zinc resinate, heat until thoroughly incorporated, withdraw from fire and allow to cool. Add 400 pints of turps.

A good cheap furniture and rubbing varnish can be made by mixing two pints of the above with 1 pint medium heavy gloss oil, and a satisfactory floor varnish by mixing four pints of the above with one pint of gloss oil.

The following three books will be found to contain much valuable information on varnishes:—

The Manufacture of Varnishes. By John Geddes McIntosh, based on and including the work of A. Livache. In three Volumes. London: Scott, Greenwood & Son.

Vol. I. *Oil Crushing, Refining and Boiling, the Manufacture of Linoleum, Printing and Lithographic Inks, and India-Rubber Substitutes.* Price 7s. 6d. net.

Vol. II. *Varnish Materials and Oil-Varnish Making.* Price 10s. 6d. net.

Vol. III. *Spirit Varnishes and Spirit Varnish Materials.* Price 12s. 6d. net.

SECTION IV.

SOAPS FOR TOILET, CLEANSING, POLISHING, ETC.

Benzoin Soap.

	Lb.	Oz.
White curd toilet stock soap	50	0
Siam benzoin (dissolved)	2	0
Oil of geranium	0	2
Balsam Peru	0	1
Oil of orange	0	2
Oil of cloves	0	3
Oil of cassia	0	½
Oil of lavender	0	2

Benzoin Soap.

	Lb.
White soap	50
Tincture of benzoin	4

Coloured brown (with caramel). The tincture of benjamin is produced by treating a fine sort of the benzoin rosin (amygdaloidal benzoin), which must be pulverised, with alcohol. Benzoin soap has an agreeable, vanilla-like odour.

Benzoin Soap.

	Lb.	Oz.
White curd toilet stock soap	50	0
Siam benzoin (dissolved)	3	0
Balsam Peru	0	3
Oil of geranium	0	2
Oil of cloves	0	2
Oil of rosemary	0	½
Oil of petit-grain	0	½
Cumarin	0	¼

Marshmallow Soap.

	Lb.	Oz.
White curd toilet stock soap	25	0
Siam benzoin	0	1
Balsam tolu	0	3
Balsam Peru	0	5
Oil of bergamot	0	4
Oil of cloves	0	2
Oil of cassia	0	3
Oil of lavender	0	6
Oil of orange	0	4
Oil of caraway	0	2

Marshmallow Soap.

	Lb.	Oz.
White curd toilet stock soap	50	0
Balsam Peru	0	¼
Balsam tolu	0	½
Tincture of benzoin	0	½
Oil of lavender	0	¼
Oil of cloves	0	½
Oil of cassia	0	¼
Oil of lavender	0	½
Oil of orange	0	¼
Oil of caraway	0	¼

Patchouli Soap.

	Lb.	Oz.
White soap	50	0
Patchouli oil	0	4¼
Sandal oil	0	¾
Vetiver oil	0	½

Patchouli Soap.

	Lb.	Oz.
White curd toilet stock soap	40	0
Yellow-palm oil curd toilet stock soap	10	0
Patchouli oil	0	1½
Oil of sandalwood	0	1½
Oil of rosemary	0	¼
Oil of lavender	0	¾
Tincture of benzoin	0	2
Victoria green	0	1

White Transparent Glycerine Soap.

Materials:—

	Lb.
Cochin cocoanut oil	55
Stearine	25
Castor oil, white	20
Soda lye of 38° B	52
Alcohol, 98 per cent.	60
Sugar	20
Distilled water	20
White glycerine	49

Perfume:—

	Oz.
Oil of bergamot	8
Lavender	2
Thyme	½
Fennel	½
Orange	½

White Transparent Glycerine Soap.

Materials:—

	Lb.
Cochin cocoanut oil	60
Stearine	20
White castor oil	20
Caustic soda lye of 38° B.	53
Alcohol, 96 per cent.	70
White glycerine	60
Sugar	25
Distilled water	25

Perfume:—

	Lb.	Oz.
Oil of bergamot	½	0
Oil of sassafras	¼	0
Oil of lavender	0	5
Oil of thyme	0	2½
Oil of lemon	0	1
Oil of lemon-grass	0	2

White Alabaster Soap.

13 lb. stearine, 22 lb. bleached palm oil, 1 lb. glycerine, 18 lb. 38° lye, 26 lb. 96 per cent. alcohol. The stearine and palm oil are

to be heated to 125°, saponified with the lye the alcohol added, and when the combination, which takes place at once, is complete, the glycerine is put in. When clear the kettle is covered and the contents are allowed to stand at 95° F. The soap is run into the moulds and perfumed with 12 oz. bergamot oil, 3 oz. geranium oil, 2½ oz. neroli oil, 3 oz. citron oil. As this is a white soap no colour is added.

Potpourri Soap.

The French make a very much used toilet soap which they call *savon au potpourri.* This soap is prepared in the following manner: 6 lb. of white soap are reduced to a fine powder and then the following perfume is added:—

	Oz.
Tincture of cloves	2
Tincture of neroli	2
Tincture of thyme	2
Tincture of bergamot	2½
Tincture of oil of roses	2½

Cucumber-Milk Soap.

	Lb.	Oz.
White stock soap	75	0
Fine rosemary oil	0	1
Lemon oil	0	5
Balm-fir oil	0	2
Terpinol	0	4
Geranium oil (French)	0	4
Juniper-berry oil	0	1
Civet tincture	0	2

Bitter-Almond Soap.

	Lb.	Oz.
Cocoanut oil	20	0
Lard oil	30	0
Soda lye (40° B.)	25	0
Bitter-almond oil	0	2
Bergamot oil	0	1½
Lemon oil	0	1

Not coloured. In place of the oil of bitter almonds, 2 oz. nitrobenzol (mirbane essence) are employed for cheaper soaps.

Bitter-Almond Soap.

	Lb.	Oz.
White stock soap	75	0
Pure oil of bitter almonds	0	20
Cumin oil	0	5
Lavender oil	0	3
African geranium oil	0	2

Peach-Blossom Soap.

	Lb.	Oz.
White stock soap	75	0
Clove oil	0	2
Pure rose oil	0	1
Pure bitter-almond oil	0	1
French geranium oil	0	2
Ceylon cinnamon	0	2
Nutmeg oil	0	½
Neroli	0	½
Civet tincture	0	2
Amber	0	2
Bright rose (without water)	0	4
Light tampico yellow (without water)	0	4

Almond-Blossom Soap.

	Lb.	Oz.
White stock soap	75	0
French geranium oil	0	5
Pure rose oil	0	¼
Ceylon cinnamon	0	2
Pure oil of bitter almonds	0	½
Ylang-ylang oil	0	¼
Terpinol	0	2
Vanillin	0	¼
Civet tincture	0	1

Colour with red rose and cinnabar.

Quince Soap.

	Lb.	Oz.
White stock soap	75	0
Fine lavender oil	0	1
White thyme oil	0	2

	Lb.	Oz.
Portugal oil	0	5
Oil of cloves	0	1
Patchouli oil	0	½
Geranium oil	0	2
Peru Balsam oil	0	2
Musk tincture	0	1
Cinnabar	0	1
Gold ochre	0	1

Lily Milk Soap.

	Lb.	Oz.
White stock soap	75	0
Petit-grain oil	0	5
Bergamot oil	0	15
Liquid orris	0	1
Terpinol	0	2
Civet tincture	0	2
Musk-root tincture	0	5

White Elder-Flower Soap.

	Lb.	Oz.
White stock soap	75	0
Terpinol	0	15
Pure rose oil	0	1
Geranium oil	0	2
Ylang-ylang	0	1
Angelica oil	0	½
Heliotropine	0	½
Civet tincture	0	1
Musk	0	1
Cumarin	0	2½

Blue Elder-Flower Soap.

	Lb.	Oz.
White stock soap	55	0
Terpinol	0	18
Geranium oil	0	5
Ceylon cinnamon	0	2
Liquid orris	0	1

	Lb.	Oz.
Ylang-ylang oil	0	1
Cananga oil	0	½
Heliotropine	0	½
Bergamot oil	0	2
Cumarin tincture	0	2
Civet	0	1
Musk	0	2

lour with aniline violet and bright rose as required.

Hyacinth Soap.

	Lb.	Oz.
White stock soap	55	0
Bergamot oil	0	5
French essence of hyacinth	0	1
Pure rose oil	0	½
Liquid orris	0	1
Parma violet	0	1
Ylang-ylang oil	0	¼
Petit-grain oil	0	1
Angelica oil	0	½
Vetiver oil	0	½
Tonka tincture	0	2
Civet	0	5
Bright rose (without water)	0	¼
Light gold uranium (without water)	0	¼

Acacia-Blossom Soap.

	Lb.	Oz.
White stock soap	25	0
Neroli	0	1½
Clove oil	0	1
Bergamot oil	0	2
Ylang-ylang oil	0	½
Liquid orris	0	1
Ceylon cinnamon	0	2
Pure rose oil	0	½
Vanillin	0	½
Heliotropine	0	2
Civet tincture	0	2

	Lb.	Oz.
Musk	0	1
Dark yellow chrome	0	2
Gold ochre	0	1

Fennel Soap.

	Lb.	Oz.
Soap	60	0
Fennel oil	0	2½
Caraway oil	0	1½

No colour.

Lemon Soap.

	Lb.	Oz.
Soap	60	0
Lemon oil	0	1
Bergamot oil	0	½
Grass oil	0	¼

Colour yellow (with saffron or turmeric).

Camphor Soap.

	Lb.	Oz.
Soap	60	0
Camphor	0	2
Caraway oil	0	½
Rosemary oil	0	½

To be left white.

Coriander Soap.

	Lb.	Oz.
Soap	60	0
Anise oil	0	½
Bergamot oil	0	1
Lemon oil	0	1
Coriander oil	0	2

Colour optional or white.

Bisam Soap.

	Lb.	Oz.
Cocoanut oil soap	20	0
Pale oil soap	20	0
Tallow soap	20	0
Bisam essence, dissolved in alcohol	0	½
Bergamot oil ,, ,,	0	¼
Clove oil ,, ,,	0	¼
Geranium oil ,, ,,	0	¼

Colour brown. The bisam essence is prepared by treating $1\frac{1}{2}$ oz. civet and 4 oz. potash with 4 oz. alcohol.

Bouquet Soap.

	Lb.	Oz.
Soap	60	0
Bergamot oil	0	2
Clove oil	0	1
Sassafras oil	0	$\frac{1}{2}$
Sage oil	0	$\frac{1}{2}$

Colour brown with caramel or umber.

Bouquet Soap, B.

	Lb.	Oz.
Soap	60	0
Bergamot oil	0	1
Lemon oil	0	$\frac{1}{2}$
Clove oil	0	$\frac{1}{4}$
Neroli	0	$\frac{1}{4}$
Sassafras oil	0	$\frac{1}{2}$
Cinnamon	0	$\frac{1}{4}$

Colour brown, or reddish-brown by a suitable addition of red colour, for which highly washed oxide of iron, the so-called colcothar, is very suitable.

Sorb Soap, A, Finest Quality.

	Lb.	Oz.
Cocoanut-oil soap	20	0
Palm-oil soap	20	0
Tallow soap	20	0
Lemon oil	0	$\frac{1}{4}$
Bergamot oil	0	$\frac{1}{4}$
Lavender oil	0	$\frac{1}{2}$
Neroli oil	0	$\frac{1}{4}$
Peppermint oil	0	$\frac{1}{4}$
Verbena oil	0	$\frac{1}{4}$
Cinnamon oil	0	$\frac{1}{4}$

Colour yellow or red. Yellow, with gamboge, 2 oz.; red, with vermilion, $1\frac{1}{2}$ oz.

The Same, B, Average Quality.

Soaps as in A.

	Oz.
Lavender oil	¼
Clove oil	½
Orange-peel oil	½
Patchouli oil	¼
Cinnamon oil	¼

The Same, C, Ordinary Quality.

Soap mass and colour as above, perfumed with:—

	Oz.
Lemon oil	½
Caraway oil	½
Curled-mint oil	¼
Rosemary oil	¼
Sage oil	¼
Spike oil	½

Thyme Soap.

	Lb.	Oz.
Tallow soap	18	0
Palm-oil soap	12	0
Benjamin tincture	0	2½
Lavender oil	0	¾
Clove oil	0	½
Peppermint oil	0	2
Rosemary oil	0	2
Thyme oil	0	2
Cinnamon oil	0	½

Colour red with vermilion, brown with ochre, or black with lampblack.

Eau-de-Cologne Soap.

	Lb.	Oz.
White soap	150	0
Neroli oil	0	4
Citronella oil	0	4
Lavender oil	0	½
Bergamot oil	0	2
Civet essence	0	½

Lavender Soap.

	Lb.	Oz.
Cocoanut-oil soap	30	0
Tallow soap	30	0
Lavender oil	0	8
Ambergris essence	0	2

Colour pale blue.

Millefleur Soap (French Recipe).

Soap as per preceding recipe.

	Oz.
Bergamot oil	2
Cassia oil	¼
Lemon oil	1¼
Lavender oil	1¼
Clove oil	1
Palm-rose oil	¼
Patchouli	¼
Peruvian balsam	¾

Colour rose with alkanet.

Millefleur Soap (German Recipe).

Soap as per preceding recipe.

	Oz.
Bergamot oil	1½
Lemon oil	¼
Coriander oil	½
Cassia oil	½
Lavender oil	1¼
Neroli oil	¼
Clove oil	1
Mace oil	¼
Balm oil	¼
Cinnamon oil	¼

Colour pale red with vermilion.

Millefleur Soap.

	Lb.
Tallow	25
Cocoanut oil	12

	Lb.
Olive oil	12
Soda lye (40° B., saponify the fats)	24

Perfume with :—

	Oz.
Bergamot oil	1½
Lavender oil	1½
Clove oil	1½
Neroli	½
Thyme oil	½
Cinnamon oil	¼

Colour optional

Mirbane Soap.

	Lb.
White soap	100
Nitrobenzol	1 to 2

This is also sold as bitter-almond soap, but is quickly recognised on comparing.

Palm Soap.

	Lb.	Oz.
Palm-oil (unbleached) soap	12	0
Tallow soap	12	0
Cocoanut-oil soap	24	0
Cassia oil	0	1¼
Fennel oil	0	½
Caraway oil	0	1½
Lavender oil	0	1½
Sassafras oil	0	1½

Colour high red with vermilion.

Rose Soap, Finest Quality.

	Lb.	Oz.
Cocoanut-oil soap	24	0
Tallow soap	55	0
Rose oil	0	1½
Bergamot oil	0	¾

Colour red with vermilion, alkanet or cochineal.

Rose Soap, Second Quality.

	Lb.	Oz.
Cocoanut-oil soap	60	0
Bergamot oil	0	1½
Geranium oil	0	1½
Musk tincture	0	½
Rose oil	0	¼
Sassafras oil	0	¼

Colour as above. Alkanet is always used for dark purple.

White-rose Soap.

	Lb.	Oz.
Cocoanut-oil soap	60	0
Ambergris tincture	0	¼
Cassia oil	0	½
Geranium oil	0	3
Oil of cloves	0	¾
Musk tincture	0	¼
Rose oil	0	1

Remains white.

Orange-flower Soap.

	Lb.	Oz.
Cocoanut-oil soap	30	0
Tallow soap	30	0
Neroli oil	0	2
Geranium oil	0	¼

Floating Soap.

Good oil soap, ½ cwt.; water, ½ gallon; melt by the heat of a steam- or water-bath in a pan furnished with an agitator, which must be assiduously worked till the soap has at least doubled its volume, when it must be put into the frames, cooled, and cut into pieces. Lathers well and is very pleasant. Any scent may be added.

Harness Soap.

Take rosin soap, 2 lb.; sperm. oil ¾ lb. Digest the soap with a quantity of boiling water just sufficient to thoroughly soften it, when it may be triturated with the warm oil and a sufficient quantity of

fine boneblack until a uniform paste is obtained. Ordinary unmixed soap turns brown many of the black pigments in use. The addition of oil is a great improvement.

Mercury Soaps.

The Farbenfabriken F. Bayer & Co. make a mercurial soap by mixing soap with the alkali salts of complex substitution products of mercury and the carbonylic acids of the aliphatic or aromatic series. For example, two parts of the sodium compound of oxymercuric-acetic acid are triturated with 100 parts of hard or soft soap. Other mercuric compounds may be used, such as the compound of potassium with oxymercuric-propionic acid, or the corresponding sodium compounds of oxymercuric-butyric or salicylic acid.

Iodine Soap.

	Lb.
Neutral white soap	98
Iodine	2

This should be made fresh as required, as it does not keep; the iodine gradually acts on and combines with the alkali of the soap, thereby losing its medicinal virtues.

Tannin Soap.

	Lb.
Good white soap	97
Tannic acid	3

Salicyl Soap.

	Lb.
Good white soap	98
Salicylic acid	2

Thymol Soap.

	Lb.
Good white soap	97
Thymol	3

Shaving Soap.

A good shaving soap should give an abundant lather and be mild. The lather formed should be permanent. These properties are

rarely found united in laundry soaps because they are generally too strongly alkaline. There are various methods for making these soaps, partly by boiling. Their composition, by whatever method prepared, is about the same. The materials used are tallow, lard, and cocoanut oil; these are saponified with soda and potash lye.

1. A very fine shaving soap is obtained in the following manner, by the cold process:—

	Lb.
Lard	60
Cocoanut oil	20
Caustic soda lye, 35° B.	30
Caustic potash lye, 35° B.	10

Mix all together at 120° F. and allow to set.

2. By the half-warm process: 40 lb. tallow and 20 lb. cocoanut oil are heated together to 62° C., then saponified under continuous stirring and heated at 75° C. with 36 lb. caustic soda lye, 30° B., and 18 lb. caustic potash lye, 30° B.

In case the soap is too short several pounds of water are stirred in, after which it is perfumed and framed in small frames to cool it quickly.

3. Tallow and lard are boiled with caustic soda lye to a curd soap. Then cocoanut oil is added, and the oily curd is saponified with potash lye of 30° B. In case the curd is too thick water must be added, and the soap boiled until it has become more fluid.

The soaps are generally perfumed with oil of lavender, oil of bergamot, oil of peppermint, etc.

Military Shaving Soap.

Under this name a molten palm soap of very agreeable smell is sold. 500 lb. of palm-oil soap are melted as above, coloured with colouring and scented with:—

	Lb.
Oil of cinnamon	1
Oil of kummel	1½
Oil of lavender	1½
Oil of thyme	1
Oil of peppermint	½
Oil of bergamot	2

This soap smells especially good when dry.

Shaving Paste.

	Lb.	Oz.
Soap	10	0
Alcohol	0	1
Oil of bitter almonds	0	1¼
Oil of bergamot	0	¾
Oil of mace	0	⅓
Oil of cloves	0	½

Melt the soap with just enough water to convert it into a soft paste when cold. The paste is then well rubbed up in a marble mortar, or passed several times through a kneading machine. This treatment is necessary in order to impart to the soap that fine pearly appearance so much esteemed by consumers of this class of article.

Shaving Liquid.

	Lb.
White soap	10
Alcohol	20
Orange-flower water	30

Melt up the soap with some of the orange-flower water at as low a temperature as possible, and when complete solution has taken place add the rest of the orange-flower water and the alcohol. After the finished product has stood for a few hours in a closed vessel it is boiled. Some makers filter the solution, but if very pure materials are taken, and if the solution is allowed to stand and deposit any insoluble matter as we have just recommended, the filtration, which is a long and tedious process, will become quite unnecessary. Cocoanut-oil soap is the best to use.

Shaving Soap.

	Lb.
Purified tallow	90
Cocoanut oil (first quality)	10
Soda lye	80
Potash lye	20

Colour and scent to taste.

Most shaving soaps contain cocoanut oil, as this fat is particularly efficacious in making them lather well.

Shaving Liquid.

	Lb.	Oz.
White soap (cocoanut-oil soap)	12	0
Essence of fat almonds	$1\frac{1}{4}$	0
Alcohol	6	0
Rose water	6	0
Tincture of amber	0	2
Tincture of benzoin	0	2

The manipulation is the same as that described above. The soap may be dyed pink with alkanet or cochineal tincture.

Windsor Shaving Soap.

Melt together 400 lb. of tallow and 200 lb. of cocoanut oil. When the temperature is 110° F. stir in a mixture of 340 lb. of soda lye (34° B.), and 60 lb. of potash lye (30° B.). When the soap will scum in spite of stirring it is ready for pouring, and this generally is the case in about twenty minutes. Scent with oil of kummel, 2 lb.; lavender oil, $2\frac{1}{2}$ lb.; and oil of thyme (white), 2 lb.

Windsor Shaving Soap.

	Lb.
Very pure white tallow	33
Cocoanut oil (first quality)	16
Soda lye (30° B.)	28
Potash lye (30° B.)	5

Scent a few minutes after pouring with essence of caraways, $2\frac{1}{2}$ oz.; essence of bergamot, $3\frac{3}{4}$ oz.; essence of Portugal, $\frac{1}{2}$ oz.; essence of cloves, $\frac{1}{10}$ oz.; essence of lavender, $1\frac{1}{4}$ oz.; and essence of thyme, $1\frac{1}{4}$ oz. After the soap has set, cut it up, dry the pieces, and rub them with a very dry cloth to remove any adherent dust.

Basic Powder Soaps.

Superfatted basic powder soaps are produced by adding to the neutral solid soap a mixture of 2 per cent. oleic acid and 3 per cent. of lanolin and mixing them intimately with it, whereupon the whole is allowed to dry as powder and is rubbed down. Alkaline basic powder soap is produced by adding to the neutral soap a mixture of 2·5 per cent. of carbonate of potash (potash) and 2·5 per cent. of

carbonate of soda (soda) to 5 per cent., thoroughly mixing everything. The alkaline powder soaps are used only when a very vigorous action is desired.

Soap Powders.

Hard and dry soaps can be ground to powder without difficulty. What is known as "pearl soap powder" is made of:—

	Cwt.
Curd (hard) soap, powdered	4
Ammonia soda, powdered	3
Silicate of soda, powdered	2

Made as dry as possible, and intimately mixed.

Borax Soap Powder.

	Cwt.
Curd (hard) soap in powder	5
Soda ash in powder	3
Silicate of soda in powder	2
Borax (crude) in powder	1

Each ingredient is thoroughly dried, and all mixed together by sifting.

London Soap Powder.

	Cwt.
Yellow soap	6
Soda crystals	3
Pearl ash	1½
Sulphate of soda	1½
Palm oil	1

These ingredients are combined as well as possible without any water, and they are spread out to dry and then ground into coarse powder.

Paraffin Dry Soap.

20 lb. dry soap, 70 lb. soda crystals, 8 lb. refined alkali, and 2 lb. soft paraffin scale. All ground together.

Oatmeal Dry Soap.

15 lb. soap, 70 lb. soda crystals, 8 lb. refined alkali, and 7 lb. oatmeal. All ground together.

Cheap Dry Soap.

15 lb. soap, 50 lb. soda crystals, 5 lb. soda ash, 30 lb. Glauber's salt. All ground together.

Borax Dry Soap.

25 lb. soap, 60 lb. soda crystals, 5 lb. borax, 10 lb. refined alkali. A better quality can be made from 25 lb. soap, 10 lb. refined alkali, 50 lb. soda crystals, 15 lb. borax. All ground together.

Extra Dry Soap.

30 lb. soap, 60 lb. soda crystals, 10 lb. refined alkali. All ground together.

Standard Dry Soap.

20 lb good soap, 70 lb. soda crystals, and 10 lb. refined alkali. All ground together.

Polishing Soaps.

(*a*) 20 to 25 lb. liquid curd soap are intimately mixed with about 30 lb. of fine chalk, and ½ lb. Venetian red. (*b*) 26 lb. liquid cocoanut-oil soap are mixed with 12 lb. Tripoli, and 1 lb. each of alum, tartaric acid and white lead. (*c*) 25 lb. melted cocoanut oil are saponified with 12 lb. of soda lye of 38° to 40° B., after which 3 lb. rouge, 3 lb. water, and 2 oz. ammonia are crutched in. Polishing soaps are generally cut into cakes, and stamped or pressed, and brought into commerce with directions for use. The directions generally state, a small quantity of soap is put on the metallic article to be polished with a damp flannel, and rubbed until the desired polish is obtained. Good recipes for polishing pastes are the following: (*d*) 5 lb. of lard or yellow vaseline, are melted and mixed with 1 lb. of fine rouge. (*e*) 2 lb. palm oil, and 2 lb. of vaseline, are melted together, and then 1 lb. rouge, ½ lb. tripoli, and 1 oz. oxalic acid are stirred in. (*f*) 4 lb. vaseline, 2 lb. oleic acid, and 1 lb. tripoli, and sufficient kieselguhr are mixed together to form a paste of suitable consistence. (*g*) 4 lb. of vaseline and 1 lb. lard are melted and mixed with 1 lb. rouge. The polishing pomades are generally perfumed with essence of mirbane, and filled into tin boxes. POLISHING POWDERS are advantageously prepared according to the following recipes: (*h*) 4 lb. magnesium carbonate, 4 lb. chalk and 4 lb. rouge, are intimately mixed. (*i*) 4 lb.

magnesium carbonate are mixed with $\frac{1}{4}$ lb. of fine rouge. (*j*) 5 lb. fine levigated whiting and 2 lb. Venetian red are ground together. Fluid polish (1) 16 lb. crude oleic acid, 4 lb. tasteless mineral oil, 5 lb. kieselguhr, $1\frac{1}{2}$ oz. lemon oil.

Polishing Soap.

A good polishing soap may be made by mixing 100 lb. of cocoanut-oil soap (with sufficient water to make it fluid), 10 lb. of tripoli, 5 lb. of alum, 5 lb. of cream of tartar, and 5 lb. of dry whiting. These should be pulverised together and cast into cakes.

Silversmiths' Soap.

	Lb.
Pipeclay	15
Chalk, levigated	10
Crystal carbonate of soda	4
Cocoanut-oil soap	4
Water	$1\frac{1}{2}$ gallons.

Method.—Shave the soap and boil in the water with soda, then well mix with others, afterwards forming into 4 oz. tablets.

Universal Polishing Soap.

	Lb.
Soft soap	25
Powdered wood charcoal	12
Powdered rottenstone	$5\frac{1}{2}$

Method.—Melt the soap and stir in the charcoal, then remove from the fire and add the rottenstone, stirring until cold. Then make into tablets, or cut out in circular pieces for putting up in china pots. It is used with water.

Polishing Soaps for Metals.

Polishing soap applicable to bronze and silver ware. 12 oz. white chalk, 12 oz. tartaric acid, and $9\frac{1}{2}$ oz. kieselguhr are freed from grit by sifting. To the sifted mass are added, $7\frac{1}{8}$ oz. glycerine, $7\frac{1}{8}$ oz. water, and $\frac{7}{8}$ oz. spirit. The soap thus made is poured into the metal moulds. A second receipt is as follows: 11 lb. cocoanut oil are mixed with $17\frac{1}{2}$ lb. soda lye at 23° (to be obtained from a soap boiler). Boiling is then proceeded with until a clear mass like glue

is produced. After the process of saponification has been completed there are added 2½ lb. chalk, 17¾ oz. white lead, 17¾ oz. tartar, and 17¾ oz. alum, these substances being all finely pulverised. Moulding then follows and a slight pressure.

When used these soaps must be wetted with lukewarm water and applied with a soft wetted brush to the objects to be cleaned, which may be of silver, copper, bronze, brass, German silver, nickel, etc. By a subsequent rubbing with chamois leather a brilliant polish is produced, which is said to be superior to that obtained by the use of any other preparation.

Magic Marble Soap.

	Lb.
White soft soap	30
Pearlash	24
Powdered pumice	15
Whiting	12

Method.—Grind all to a stiff mass, using a little water if necessary, then press into ½ lb. bars or tablets. The marble is well scoured with the soap until the stains and dirt are removed, then wiped dry, and finally polished with furniture cream.

Grease Eradicator.

Castile soap, in shavings, 4 oz.; carbonate of soda, powdered, 2 oz.; borax, powdered, 1 oz.; aqua ammonia, 7 oz.; alcohol, 3 oz.; turpentine, 2 oz.; Sulphuric ether, 2 oz. Grind all together in a mortar.

Soap for Removing Rust (*Poisonous*).

	Lb.
Whiting	9
Oil soap	6
Cyanide of potassium	5
Water	6 gallons.

Dissolve the soap in water over the fire and add the cyanide, then, little by little, the whiting. If the compound is too thick, which may be due either to the whiting or the soap employed, add a little water until a paste is made which can be run into an iron or wooden mould. This will remove rust from steel and give it a good polish.

Liquid Nicotine Soap for Gardeners.

	Lb.
Tobacco waste, or duty-free snuff	4
Soft soap	4
Water	50 gallons.
Methylated spirit	2½ gallons.
Amylic alcohol (fusel oil)	¾ gallon.

Boil tobacco in ½ gallon of water for thirty minutes and strain, adding water to make up for that evaporated; next boil the soft soap in the whole of the water and add the tobacco juice, then cool and add the alcohols. The mixture is to be diluted with an equal amount of water, well stirred before being used by the horticulturist, and is syringed over the parts.

Carpet Soap.

	Lb.
Dry white soap	22
Purified ox-gall	1 gallon.
Genuine turps	¾ gallon.
Water	½ gallon.

Method.—Shave the soap up finely, and melt down in the water on a water-bath; when wholly dissolved and smooth, cool down and thoroughly mix with the turps and gall. When cold, form into ¼ lb. cakes, and wrap. The usual directions for use apply.

Soap for Celluloid Goods.

	Lb.
Pipeclay	22½
Dry white soap (sliced)	10
Water	7
Finest pumice powder	5½
Oxalic acid	1¼

Method.—Dissolve the oxalic acid in the water, then mix all together to form a pasty mass, finally moulding or cutting up into 2 oz. pieces.

Cloth Soap.

	Lb.
Powdered fuller's earth	20
Soft soap	14
Oil of lemon	1
Turps	6 pints.

Method.—Mix the earth and soap to a paste, gradually working in the two fluids. Then make into cakes with these directions on the wrapper: "First moisten the dirty spot with hot water, then rub with the cake of soap until saturated, then leave until nearly dry. Now brush out with a little warm water and a stiff brush, rinse with cold water, finally smoothing off with a piece of clean dry cloth or a soft brush."

Fuller's Earth Soap.

	Lb.
Soap	70
Fuller's earth	30

The fuller's earth is thoroughly dried before adding to the soap; the latter should not contain less than 25 to 30 per cent. water.

Ox-Gall Soap for Silks.

The following directions are given for an ox-gall soap to be employed in cleansing silks and satins: 1 lb. of cocoanut oil is heated to 30° (100° F.), ½ lb. of white Venetian turpentine is heated and then stirred into this soap. The soap is left to stand covered up for four hours, then heated again just sufficiently to make it flow, when 1 lb. of ox-gall is well stirred in. Some good curd soap which is perfectly dry is then pulverised, and enough of it stirred into the gall soap to make it solid, so that it yields but little to the pressure of the fingers. It will require from 1 to 2 lb. of curd soap to accomplish this. When the mass gets cold it can be cut or pressed into cakes.

Liquid Glycerine Soap.

Melt together pale oleic acid, 274 lb.; cocoanut oil, 66 lb.; then add caustic potash lye, 60° Tw., 288 lb.; boil up and when saponified add glycerine, 20 lb., and enough methylated spirit to make the liquor clear.

Liquid Soap from Cotton-seed Oil.

Sodium hydrate, gm. 40; potassium hydrate, gm. 40; cotton-seed oil, cc. 500; alcohol, cc. 250; distilled water, a sufficient quantity to make cc. 2,500. In a suitable container, preferable a glass-stoppered bottle, dissolve the potassium hydrate and the

sodium hydrate in 250 cc. of distilled water, add the alcohol and then add the cotton-seed oil in 3 or 4 portions, shaking vigorously after each addition. Continue to agitate the mixture occasionally, until saponification has been completed. Then add the remaining portion of distilled water and mix. The only precautions that are at all necessary are to use a good grade of ingredients, and to be sure that saponification is complete before adding the remaining portions of the distilled water. The water used must be absolutely free from soluble salt of the alkali earths or the heavy metals, and for this reason should be preferable freshly distilled. For toilet purposes a suitable scenting material is added.

Paste Soap.

Weinstein prepares paste soap by melting 400 to 600 parts of dry powdered olein or tallow in an ordinary pan, and adding in succession 400 to 600 parts of caustic soda lye (14 per cent. strength), 100 parts of 30° glycerine, and 11,000 parts of water. After crutching thoroughly until boiling-point is reached, the mass is poured into frames, which are kept warm for twelve to twenty-four hours. When cold the soap forms a soft paste, ready for packing into boxes or casks. The lathering properties are improved by a small addition of rosin soap or alkali silicate, or by replacing a portion of the original stock soap by cocoanut oil or palm-oil soap.

For accounts of the various oils and fats used in soap-making, besides the books just named, reference can be made to:—

Animal Oils and Fats. By Louis Edgar Andés. Price 10s. 6d. net. Scott, Greenwood & Son.

Vegetable Fats and Oils. By Louis Edgar Andés. Price 10s. 6d. net. Scott, Greenwood & Son.

SECTION V.

PERFUMES.

Lavender Water.

Oil of Mitcham lavender	4 fl. oz.
Tinct. musk	6 drops.
Perfumer's spirit	4 gallons.
Warm distilled water	½ gallon.

Superfine Eau-de-Cologne.

	Parts.
Rosemary oil	8
Lavender oil	10
Balm oil	1
Portugal orange oil	24
Neroli oil	30
Clove oil	1
Petit-grain oil	36
Citron oil	54
Lemon-rind oil	54
Spirit	9,500

Superfine Eau-de-Cologne.

	Parts.
Pineapple oil	60
Orange oil	25
Lemon oil.	10
Cinnamon oil	10
Citron oil	10
Rosemary oil	25
Lavender oil	20
Bergamot oil	10

	Parts.
Petit-grain oil	10
Peppermint oil	1·5
Distilled water	3,000
Spirit	10,000

Superfine Eau-de-Cologne.

	Parts.
Bergamot oil	7
Lemon oil	17
Petit-grain oil	10
Neroli oil	3·3
Rosemary oil	7
Musk tincture	10
Spirit	3,000

Superfine Eau-de-Cologne.

	Parts.
Rosemary oil (French)	10
Lavender oil	4
Balm oil (German)	2
Petit-grain oil	34
Citron oil	60
Lemon oil	38
Bergamot oil	106
Neroli oil	20
Limetta oil	16
Portugal sweet orange oil	40
Spirit	7,000

Fine Eau-de-Cologne.

	Parts.
Neroli oil	15
Bergamot oil	85
Petit-grain oil	30
Rosemary oil	15
Lavender oil	44
Peppermint oil	1
Distilled water	5,000
Spirit	7,500

Ordinary Eau-de-Cologne.

	Parts.
Bergamot oil	42
Lemon oil	38
Portugal oil	25
Lavender oil	16
Rosemary oil	68
Thyme oil	8
Petit-grain oil	8
Spirit	4,000
Distilled water	2,800

New Mown Hay.

	Parts.
Patchouli oil	8
Bergamot oil	60
Geranium oil	20
Cumarin tincture	3,000
Orris	3,000
Spirit	3,000
Distilled water	1,000

New Mown Hay.

	Parts.
Rose oil	10
Bergamot oil	60
Patchouli oil	10
Civet tincture	30
Cumarin tincture	3,000
Jasmine extract I.	4,000
Rose extract I.	2,000
Acacia extract I.	1,000
Rosewater	250

Rose.

	Parts.
Rose oil	28
Bergamot oil	60
Benzo tincture	30
Musk tincture II.	30
Cassia extract II.	2,000
Spirit	7,500
Rosewater	500

Rose.

	Parts.
Geranium oil	80
Bergamot oil	30
Spirit	9,000
Distilled water	2,000

Syringa.

	Parts.
Terpene oil	120
Musk tincture	30
Jasmine extract II.	6,000
Cassia extract II.	2,000
Orange extract II.	2,000
Spirit	3,000
Orange-flower water.	250

Heliotrope.

	Parts.
Lemon oil	60
Wintergreen oil (pure)	16
Almond oil (pure)	14
Geranium oil	4
Rose tincture	2,000
Benzoin tincture	1,000
Orris tincture	2,000
Spirit	4,000
Distilled water	1,000

May Blossom.

	Parts.
Linaloe oil	100
Bergamot oil	80
Geranium oil	20
Orris tincture	2,000
Spirit	7,000
Distilled water	1,000

May Blossom.

	Parts.
Spirit	3,000
Musk tincture	100

	Parts.
Rose oil	5
Acacia oil	3
Almond oil (pure)	6
Tonka bean tincture	200
Vanilla extract I.	200
Rose extract I.	200
Orange extract I.	1,000
Jasmine extract I.	600
Artificial neroli oil	10
Terpene oil	5
Linaloe oil	10

Lily of the Valley.

	Parts.
Bitter-almond oil	2
Ylang-ylang oil (artificial)	4
Geranium oil	4
Neroli oil	2
Bergamot oil	20
Linaloe oil	40
Cananga oil	10
Jasmine extract II	5,000
Rose extract II.	2,000
Reseda extract II.	1,000
Orris tincture	15,000
Rosewater	250
Spirit	2,500

Garden Clove.

	Parts.
Bergamot oil	30
Clove oil	30
Benzoin tincture	250
Clove tincture	1,000
Orris tincture I.	2,000
Orris tincture II.	5,000
Rosewater	250
Rose extract II.	2,000
Jasmine extract II.	3,000
Rose extract	1,000

Wood Violets.

	Parts.
Violet extract I.	800
Rose-extract I.	100
Orris root tincture	100
Musk tincture	80
Oil of bitter almonds	1

Gives an exquisite perfume of violets.

Violets.

	Parts.
Bergamot oil	30
Geranium oil	20
Musk tincture II.	30
Violet extract II.	5,000
Cassia extract II.	4,500
Orange-flower water	250
Spirit	3,000

Orange Flowers.

	Parts.
Neroli oil (artificial)	16
Bergamot oil	60
Sandalwood oil	4
Musk tincture	30
Orange extract I.	9,000
Jasmine extract I.	1,000
Orange-flower water	250

Lilac.

	Parts.
Rose extract I.	300
Jasmine extract I.	215
Orange extract I.	130
Vanillin extract I.	30
Reseda extract I.	75
Rose oil	1

Heliotropium Grandiflorum Blanc.

	Parts.
Musk tincture	30
Heliotropine tincture	5,000

	Parts.
Tuberose extract I.	2,000
Rose extract I.	2,000
Rosewater	250
Orange-leaf water	250

Musk.

	Parts.
Jasmine extract I.	500
Rose extract II.	500
Musk extract	500
Tonka bean or cumarin tincture	500

Extrait Triple a la Rose.

	Parts.
Rose extract I.	3,000
Rose extract II.	1,000
Acacia extract II.	300
Acacia extract III.	300
Tuberose extract II.	200
Violet extract II.	200
Oil of rose	10
Spanish geranium oil	60
Cedarwood oil	6
Spirit	1,500

Jonquil Scent.

	Parts.
Jonquil extract	1,000
Orris-root extract	1,000
Essence of ambergris	120
Essence of civet	100
Extract of cassia	500
Spirit of rose, triple	500
Extract of tonka bean	500
Oil of citronella	6

Mix.

Bouquet d'Amour.

	Parts.
Extract of cassia	500
Extract of jasmine	500
Essence of ambergris	125

	Parts.
Extract of violet	500
Essence of musk	125

Mix thoroughly and filter.

"Tannenduft" Scent.

	Parts.
Oil of bergamot	5
Oil of pine	100
Rectified oil of turpentine	3
Alcohol	1,000

Mix.

Flowers of Spring Scent.

	Parts.
Rose pomade extract	1,000
Extract of violets	1,000
Essence of ambergris	60
Spirit of rose, triple	150
Extract of cassia	150
Oil of bergamot	10

Mix.

Heudus Bouquet Scent.

	Parts.
Extract of tonka bean	1,000
Spirit of rose, triple	500
Extract of rose geranium	480
Extract of jasmine	500
Extract of orange flower	500
Extract of rose	500

Mix.

Esterhazy Bouquet Scent.

	Parts.
Extract of vetivert	500
Extract of violet	500
Extract of vanilla	500
Extract of tonka bean	500
Extract of orange flower	500
Spirit of rose, triple	500
Essence of ambergris	300
Sandalwood oil	40

Mix.

Reseda.

	Parts.
Bergamot oil	30
Benzo tincture	30
Tolu balsam	30
Musk	30
Cumarin	50
Reseda extract II.	5,000
Rose extract II.	3,000
Cassia extract II.	2,000
Orange-flower water	250
Spirit	2,500

Reseda and Violets.

	Parts.
Geranium oil	8
Bergamot oil	120
Cedarwood oil	30
Orris tincture I.	3,000
Orris tincture II.	2,000
Benzo tincture I.	5,000
Spirit	3,500
Distilled water	1,000

Reseda.

	Parts.
Violet extract I.	2,000
Jasmine extract I.	2,000
Acacia extract I.	2,000
Rose extract I.	500
Tuberose extract I.	1,500
Violet extract II.	1,500
Rose extract II.	1,500
Rosemary oil	5
Musk tincture	25

Ylang-Ylang.

	Parts.
Spirit	500
Rose extract I.	250
Tuberose extract I.	250
Jasmine extract I.	250
Ylang-ylang oil (artificial)	15

Ylang-Ylang.

	Parts.
Cinnamon oil	4
Ylang-ylang (artificial)	30
Cananga oil	20
Bergamot oil	20
Sandalwood oil	10
Musk tincture	30
Storax tincture	500
Orris tincture	2,500
Orange-flower water	250
Jasmine extract II.	5,000
Rose extract II.	2,000

Ess. Patchouli.

Oil of patchouli	2 oz.
Perfumer's spirit	1 gallon.

Add oil to spirit and stand until dissolved.

Patchouli.

	Parts.
Rose oil	8
Geranium oil	8
Cedarwood oil	8
Sandalwood oil	8
Patchouli oil	40
Bergamot oil	15
Musk tincture	15
Civet tincture	15
Jasmine extract II	1,000
Tuberose extract II.	500
Acacia extract II.	500
Rose extract II.	2,500
Rosewater.	500

Patchouli.

	Parts.
Rose oil	2
Geranium oil	4
Bergamot oil	30

	Parts.
Patchouli oil	30
Cedarwood oil	15
Sandalwood oil	15
Musk tincture	30
Jasmine extract II.	1,000
Cassia extract II.	1,000
Tuberose extract II.	1,000
Spirit	6,000
Rosewater	5,000

In the *Chemistry of Essential Oils and Artificial Perfumes* (by Ernest J. Parry, B.Sc. Price 12s. 6d. net. Scott, Greenwood & Son) will be found much valuable information on the preparation and properties of essential oils and perfumes.

Cosmetics, by T. Koller, price 5s. net (Scott, Greenwood & Son) contains a section on the preparation of perfumes.

SECTION VI.

LUBRICATING GREASES, OILS, ETC.

Anti-Attrition Paste.

	Lb.	Oz.
Lard	5	0
Blacklead	1	0
Camphor	0	2

Rub the camphor in a mortar with a little of the lard, and finally add the blacklead and work until homogeneous.

Anti-Attrition Grease.

To lessen friction in machinery and to prevent rusting.

	Parts by Weight.
Plumbago	1
Lard or tallow	4

Melt the tallow, stir in the plumbago and run until homogeneous. 7 lb. per cwt. of camphor can be added, if desired, rubbing it up in a mortar with the lard first.

Anti-Corrosive Oil.

Pale rosin 40 parts, thick crude rosin oil 10, neutral wool fat 20, thick green cylinder oil 30, oil of turpentine 130 parts. The rosin being melted, the other ingredients are added at a moderately warm temperature, the oil of turpentine being stirred in after they are melted, and the mixture has been taken off the fire. The articles to be protected from rusting are either dipped into the fluid mixture or painted over with it.

Anti-Rust Oil.

Caoutchouc oil (rubber oil) will form an effective coating on metals to prevent rust. It is questionable if the genuine article is a com-

mercial product, many of the mixtures generally being manufactured as herewith. When its removal is desired hot turps or benzine is laid on.

Raw rubber	10 oz.
Linseed oil	1 gallon.
Turps	½ gallon.

Cut up the rubber, having it melting while heating linseed oil in another pot, add latter to rubber, and when dissolved pour the turps in.

Carriage Grease.

	Parts.
Red transparent rosin	1
Rendered tallow	1
Caustic soda lye	1
Cotton-seed oil	1

Melt in a large open boiler at a moderate heat the rosin and tallow, and when they are united gradually stir in the soda lye and continue stirring until the mixture ceases to rise, then add the cotton-seed oil and boil it up for fifteen minutes. Strain while hot through a cotton cloth and let the compound cool, when it is ready for use.

Colliery Grease.

	Lb.
Rosin oil	10
Grease oil	8
Dark cylinder oil	6
Yorkshire grease	1

Mix all together in a homogeneous paste.

Colliery Grease.

50 lb. rosin oil, 40 lb. grease oil, 30 lb. dark cylinder oil, and 5 lb. Yorkshire grease are mixed with 20 lb. slaked lime.

Dark Floating Grease.

Is made by dissolving dry lime soap by the aid of a gentle heat in residuum oil. The lime soap is prepared by decomposing soft soap with hydrochloric (muriatic marine) acid, "killed" with chalk, as given under Solidified Oil.

Hot-Neck Grease, Common Quality.

	Lb.
Wool pitch	1
Brown Grease	4
Hard run oil	6
Dark cylinder oil	8
Dry slaked lime	1

Heat and stir together until homogeneous.

Hot-Neck Grease, Better Quality.

	Lb.
Soap	2
Filtered cylinder oil	3
·915 petroleum oil	3

Cut up the soap into shreds and dry it by heat, so as to expel all water, then mix the oils, and heat them to 240° F., add the dry soap and continue the heating until the soap has dissolved; then allow it to cool.

Locomotive Grease.

A common kind of loco grease can be made from 60 lb. Yorkshire grease mixed with 20 lb. summer dark oil, and heated with 6 lb. quicklime, slaked with 2 gallons of water. The best loco grease is made from palm oil, tallow, seal oil, and soda crystals. The soda crystals are dissolved in about an equal weight of water, and then stirred into a melted mixture of the fats. The proportions used are varied according to the different seasons of the year.

Locomotive Grease, Good Quality.

	Lb.
Tallow	25
Palm oil	14
Sperm or seal oil	1
Soda crystals	6
Water	6

Dissolve the soda in the water, having melted the tallow and oils together, stir in the lye until homogeneous.

Mica Grease.

	Lb.
Rosin oil	10
·890 or ·895 Scotch lubricating oil	10
French chalk	4
Slaked lime	4

Mix and stir well.

Patent Palm-oil Grease.

	Lb.
Rosin soap	10
Palm oil	10
Rosin oil	550
Rosin soap	*q.s.*
Caustic soda lye	7¾ to 10

Melt the rosin soap and palm oil together, then add the rosin oil and afterwards as much rosin soap as will make the mass of a buttery consistence, then add the soda lye.

Olein-Petroleum Jelly Lubricant.

According to de la Guèronnière, a form of petroleum jelly for lubricating purposes can be prepared by extracting the mucilaginous principle from the following marine plants: Fucus crispus 75 per cent., fucus perlè 20 per cent., agar-agar 5 per cent. (or the same proportion of lichen or other algae that contain gelose). The woody matter of these plants is carefully removed, after which the plants are washed separately in hot water containing 10 per cent. of common salt and 5 per cent. of carbonate of potash. The next stage is to steep the washed plants in water containing 10 per cent. of salt, and to dissolve them by gradual boiling in water. According to the concentration required, 700 to 1,000 parts by weight of the mixed plants are taken to 100,000 parts of water, for making olein-petroleum jelly, the amount being doubled in the case of a grease. The solution is filtered whilst hot, and is treated with about 800 parts of oil of turpentine, alcohol, sulphurous acid, phenol or some essential oil.

Wool-fat Lubricants.

Degras.—Blown Japanese fish-oil 30 parts, ordinary Japanese fish-oil 20, crude wool fat 20, and water 30 parts. Another recipe

consists of crude wool fat 30 parts, Japanese fish-oil 30, oleic acid 15, and carbonate of potash solution 15 to 20 parts. The fats are heated in a pan, and after the addition of the water and potash solution, the whole is stirred until the water is thoroughly incorporated.

Cog-wheel Grease.—Crude wool fat 75 parts, levigated graphite 8, talc 8, lampblack 2, and mineral oil 7 parts. This grease is sufficiently adhesive to stick to the wheels, without being tacky like greases containing rosin. At the same time, the graphite and talc form a protective coating on the metal. The grease should be painted on with a brush.

Mill-wheel Grease.—An adhesive grease for the wheels of water mills is prepared from rosin 20 parts, crude wool fat 30, and thick blue rosin oil 50 parts.

Chain Grease.—Crude wool fat 85 parts, mineral oil 10, levigated graphite 3, and lampblack 2 parts.

Belting Grease.—Neutral wool fat is melted along with 4 to 5 per cent. of yellow paraffin wax and poured into paper tubes so as to form sticks. If greater adhesion be required, 10 to 20 per cent. of rosin may be added, but this is not advisable, since it injures the leather.

Wire-rope Grease.—Neutral wool fat 80 parts, thick blue rosin oil 15, and levigated graphite 5 parts.

Hemp-rope Grease.—Soft soap 30 parts, neutral wool fat 25, mineral oil 25, levigated graphite 8, and lampblack 2 parts.

Plumbago Lubricant.

	Lb.
Slaked lime	2
Hard rosin oil	7
Anthracene oil	7
Plumbago	2

Mix and stir together at a gentle heat.

English Railway Axle Grease for Summer Use.

	Lb.
Water	685
Caustic soda	60
Sperm oil	11
Palm oil	140
Tallow	25½

Dissolve the soda in the water, mix the oil, etc., heat to near boiling, and then stir till cold.

Rosin Grease.

Take 10 lb. of quicklime, slake well with water, and sieve free from grit, stir into 30 lb. "hard" rosin oil, and allow to stand for twelve hours. By using 20 lb. "hard" and 10 lb. "soft" rosin oils, a thinner grease will be got.

Rosin-Oil Grease.

Mix together in a capacious vessel 10 lb. of rosin oil, and 8 lb. of lime, slaked to powder; heat the mixture until free from lumps and of a syrupy consistence.

Solid Greases.

Cart Grease.—Neutral wool fat 5 parts, tallow 5, paraffin wax (m.p. 114° F.) 15, lard oil 20, mineral oil (sp. gr. 0·900) 15 parts, with an addition of 5 to 10 per cent. of flaked graphite if desired. The ingredients are simply melted and stirred together.

Grease for Printing Machines—Twenty parts of tallow are melted with 20 of castor oil (first pressing), and incorporated with 10 parts of best levigated graphite.

Collector Grease.—Tallow 10 parts, neutral wool fat 10, paraffin wax (m.p. 122 to 125° F.) 15, castor oil (first pressing) 5, mineral oil (sp. gr. 0·885) 60, and best levigated graphite 10 parts. The fats and oils are incorporated by melting, the graphite being stirred in until the mass begins to thicken, whereupon the whole is put into tins. For use, as small a quantity as possible is applied to the copper of the collectors.

Bung Grease.—Tallow 8 parts, rosin 4, paraffin wax (m.p. 104° F.) 2, talc 4 parts. The first three ingredients are melted together and after the mixture has cooled down to about 158° F. the talc is stirred in. The cold mass is cut into lumps of convenient size.

Ring Grease for Twine Makers.—Tallow 40 parts, Japan wax 15, cocoa-nut oil 45 parts, simply melted together. If any alteration be made in the ingredients the substitutes should be of a saponifiable character.

Hoof Grease.—Ceresine 6 parts, paraffin wax 6, dark cylinder oil 15, tar 5, rosin 10, mineral oil (sp. gr. 0·885). The mixture may

be blackened with lampblack, in which case the mineral oil must be treated with 1 per cent. of nitro-naphthalene, or a yellow coal-tar dye, to take away the blue fluorescence.

Grease for Hemp Ropes.—(1) Yellow paraffin (m. p. 125-130° F.) 8 parts, colophony 20, blown cotton-seed oil, 10, crude wool fat 35, cylinder oil, 35, soft soap 50, talc 80 parts. The fats are melted together, and the talc is added, the whole being stirred until cold, to prevent separation of the last-named ingredient.

(2) Soft soap 10 parts levigated graphite 13, crude wool fat 5, mineral oil (sp. gr. 0·906-8) 15, blown cotton-seed oil 10 parts. Prepared in the same way as 1. These greases may be coloured by replacing a portion of the talc with colcothar, ochre, chrome yellow, etc.

Grease for Camel-Hair Belting.—Thick fluid grease: thick, crude rosin oil, 15 parts, crude wool fat 7, castor oil (second pressing) 35, talc 5 parts.

Solid Grease.—Pale rosin 10 parts, talc 5, blown cotton-seed oil 10, yellow paraffin 4 parts.

Grease for Cott n Belting.—Pale rosin 20 parts, crude wool fat 10, tallow 10, paraffin 30, mineral oil (sp. gr. 0·900-7) 20 parts. The ingredients are melted together. The consistence of the grease can be regulated by altering the proportion of the mineral oil.

Greases for Leather Belts.—A distinction is drawn between greases for rendering the leather supple, and those used for increasing its adhesion to the pulleys. An excellent grease of the former class is prepared from tallow 10 parts, paraffin 15, blown rape oil 15, bone oil 10, mineral oil (0·905-0·908) 50 parts; the ingredients being simply melted together. The adhesion greases are sold as thick fluid preparations or in the form of solid sticks. A fluid preparation is made from pale rosin 20 parts, crude wool fat 10, crude thick rosin oil 20, crude linseed oil 25, mineral oil (0·900-7) 15 parts. For the solid grease 30 parts of pale rosin, 20 of neutral wool fat, 10 of blown cotton-seed oil, 15 of paraffin, 10 of cod oil, and 15 of mineral oil (0·900-7) are melted together and poured into stick moulds of parchment paper.

Grease for Wire Ropes.—Pale rosin 20 parts, thick crude rosin oil 10, crude wool fat 15, paraffin 7, boiled linseed oil 40, talc 10 parts. The talc may be replaced by graphite, which possesses many points of superiority.

Greases for Wooden Pinions.—Hard grease: crude wool fat 40 parts, levigated graphite 40, solid machinery grease 5, yellow paraffin

5 parts. Soft grease: crude wool fat 60 parts, levigated graphite 30, mineral oil (0·900-7) 10 parts.

Pinion Greases.—Hard grease: crude wool fat 9 parts, solid machine grease 45, talc 15, stearine pitch 5 parts. Soft grease: crude wool fat 12 parts, crude rosin oil 9, solid machine grease 6, talc 12, tar 5 parts.

Solidified Oil.

Kill a quantity of muriatic acid with chalk; that is, give it as much chalk as it will take up. (1) Dissolve a quantity of soft soap in water, and filter through a cloth, so as to get quit of any dirt present in the soap. Now add your "killed" acid gradually to your soap solutions as long as anything falls out, stirring all the time. Filter, drain and dry. (2) Dissolve 5 to 20 per cent. of the dried product in the oil you wish to thicken or solidify. Note the quantities you have used for future reference, as soft soaps, chalks and muriatic acid vary in strength.

Solidified Oil.

Under this name are sold products derived from petroleum and Scotch shale oils which may be regarded as greases. To make them, take 50 lb. of ·885 to ·890 mineral oil, heat to 180° F., then throw in ½ lb. of soap cut into fine chips, and dried as much as possible by exposure to the air. The heating is kept on until the soap is completely dissolved into the oil, when the mixture may be allowed to cool down.

Belgian Waggon Grease.

	Parts.
Palm oil	30
Tallow	12
Soda lye	9
Boiling water	8 to 15
Cold water	120

Melt the palm oil and tallow in a suitable vessel and gradually add the soda lye; when the mass begins to thicken add 8 to 10 parts of boiling water free from lime, constantly stirring the whole time. Give one hour's rest, exposed to the air, then pour out into another vessel to cool it, and stir for a couple of hours, and finally add the 120 parts of cold water.

Blue Patent Waggon Grease.

	Lb.
Crude rosin oil	250
Calcium hydrate	1
Rosin soap	5 to 6

Heat the first two ingredients together for an hour, and then stir in the soap until the mixture is of a buttery consistence and of a blue colour.

Wheel Grease.

Take 5 lb. of quicklime and slake with 20 lb. of water, then sift well and stir into the lime paste 4 gallons of "hard" crude rosin oil; allow it to stand for twelve hours, pour off the water, and stir in 5 gallons of anthracene grease oil. Now heat the mass to 240° F., stir well the whole time until a good mixture is obtained, then allow to cool and set.

Medicinal Grease.

A medicinal grease is prepared from caustic lime 6 parts, stock oil 6, mineral oil (sp. gr. 0·665) 20, thin blue rosin oil 60, carbolic acid 1 part. The lime is stirred up with the mineral oil and rubbed through a fine sieve, the other oils being stirred in (the carbolic acid dissolved in a little mineral oil) and the whole stirred till it begins to thicken.

Watchmaker's Oil.

Take the purest and lightest oil obtainable and place it in a retort with 8 times its weight of absolute alcohol. Boil it for ten minutes, decant the liquid and allow it to cool, then let it evaporate until its volume is reduced to $\frac{1}{5}$, filter and keep it in well-stoppered and sealed bottles. This is suitable for the finest horological work.

Soluble Oil.

Soluble or screwing oils are made by adding enough soft soap to the mineral oil to cause it to form an emulsion with water. The addition of a little rosin oil will increase the emulsive properties. See Boleg's method, reprinted in *The Oil and Colour Trades Journal Diary for* 1911.

Screwing Oil.

For a cheap screwing oil, add enough soft soap to a Scottish 0·885 mineral oil to render it emulsive with water.

Sanctuary Oil.

	Oz.
Naphthalene	18
Camphor	6
Amyl acetate	6
Mineral colza	10 gallons.
Kerosene	5 gallons.

Crush the naphthalene and camphor, dissolve these in the kerosene, then mix with colza and amyl acetate. Do not simply pour the latter in and leave it, but stir energetically, as it is used to hide the smell of the mineral oils, replacing it with one sweet and ethereal

Confectioners' Slab Oil.

Phosphine	3 oz.
Arachide-nut oil	70 gallons.
Vaseline oil	30 gallons.

Warm a gallon or so of the nut oil, and stir the phosphine in this, then add to the rest of the oils, and stir well about to get the phosphine dissolved. as it is liable to float in tiny balls. Another mixture is made by reversing the quantities of the nut and vaseline oils and is cheaper.

Dynamo Oil, A.

	Cwt.	Qr.
·908 mineral oil	2	6
·885 mineral oil	1	14
Refined cocoanut oil	2	6

The cocoanut oil is put into jacketed pans first. Then run in ·908 and ·885, and put on blower or air for fifteen minutes, with heat at 170° F. Turn off steam; let settle and run into casks.

Dynamo Oil, B.

	Cwt.	Qr.
·908 mineral oil	2	0
·885 mineral oil	1	2
Refined cocoanut oil	1	3

Motor Cylinder Oils.

For small gas engines (6-20 h.p.) a suitable cylinder oil can be compounded of 94 parts of Russian engine oil 1 (sp. gr. 0·906-8), and 6 parts of refined rape oil. For the same motors which have been for some time in use, the mixture may consist of Russian engine oil 1, 80 parts, FFF valve-cylinder oil 10 parts, pale oil (0·900-7) 8 parts, and palm oil 2 parts. For 1 h.p. motors: Solar red oil 85 parts, steam-refined, extra filtered cylinder oil, cold test, 15 parts. Another approved recipe for 15 h.p. motors consists of Solar red oil 80 parts, FFF valve-cylinder oil 15, best bone oil, 5 parts; whilst for a 30 h.p. motor a thicker bone oil should be used, the proportion remaining unchanged.

Cylinder Oil.

	Cwt.	Qr.	Lb.
Ordinary dark cylinder oil	2	0	0
Steam-refined cylinder oil	4	2	0
Thickened rape oil	0	2	0
Lard oil	0	1	14

Cylinder Oil.

	Cwt.
Filtered cylinder oil	6
Black cylinder oil	4
Thickened rape oil	2

Put all in jacketed pan; turn on steam and heat up to 200° F. for thirty minutes, well stirring. Then let settle, and run into casks while hot.

Cylinder Oil, No. 2.

	Cwt.
Steam-refined cylinder oil	4
Thickened rape oil	1

Cylinder Oil, A Blend.

	Cwt.	Qr.
Steam-refined cylinder oil	4	2
Thickened rape oil	1	2
Lard oil	1	2

Cylinder Oil, B Blend.

	Cwt.	Qr.
Steam-refined cylinder oil	4	2
Thickened rape oil	2	0
Lard oil	2	0

Valve Oil, A Blend.

	Cwt.
Summer cylinder oil	2
Cosmos cylinder oil	4
·885 spindle oil	5

Valve Oil, B Blend.

	Cwt.
Summer cylinder oil	2
Cosmos cylinder oil	3
·885 spindle oil	6

Valve Oil, C Blend.

	Cwt.	Qr.
Summer cylinder oil	2	0
Cosmos cylinder oil	3	2
·885 spindle oil	6	2

Valve Oil, D Blend.

	Cwt.
Summer cylinder oil	2
Cosmos cylinder oil	4
·885 spindle oil	7

Tallow Composition.

	Cwt.	Qr.	Lb.
Terra alba	3	0	0
Common tallow	1	0	0
Zinc white	2	0	0
Venetian red	0	0	14

Tallow or Steel Composition.

	Cwt.	Qr.	Lb.
Zinc white	3	0	0
Common tallow	1	0	0
Venetian red	0	0	14

Colza Oil, No. 1.

	Cwt.
Colza oil, No. 1.	4
Arctic sperm	1
Mineral colza	1

Colza Oil, No. 2.

	Cwt.
Colza oil No. 1.	3
Arctic sperm	1
Mineral colza	2

Colza Oil, No. 3.

	Cwt.
Genuine colza	2
Mineral colza	1
Sperm oil	1

Eastern Colza.

	Cwt.
Genuine colza	8
Arctic sperm	1
Mineral colza	1

Lubricating Colza.

	Cwt.	Qr.	Lb.
Genuine colza	1	0	0
Castor oil	1	0	0
Lard oil	0	0	20
Thickened rape oil	0	0	5

Heavy Lubricating Oil, No. 1.

	Cwt.	Qr.	Lb.
Lard oil	1	0	0
Olive oil	1	2	0
Cocoanut oil	0	2	4

Talc Lubricant.

	Parts.
Graphite	28
French chalk	20
Sulphur	16
Wax or paraffin	16

Mix at a gentle heat.

Axle Grease for Wood.

Take 2 gallons of "medium" rosin oil, and stir in 5 lb. of quicklime, slaked with 2 gallons of water, then stand for twelve hours or until the next day. Pour off any water that may separate, then stir in 5 gallons of coal-tar grease oil and 5 lb. of powdered blacklead. Generally it will be found sufficient to mix the materials cold, but a little heating will make a more homogeneous grease.

Axle Grease.

Melt together 14 lb. of palm oil, 22 lb. anthracene oil, 10 lb. of rosin oil, and 1 lb. of soap, keeping the mixture heated until a clear transparent mass is obtained, then allow to cool.

Tram-Axle Grease, Good Quality.

Ingredients: hard rosin oil, ·885 mineral oil, slaked lime, equal weight of each. Mix and stir well.

A Tram-Axle Grease, Commoner.

	Lb.
Anthracene oil	10
Slaked quicklime	5
Ground gypsum	5

Make the quicklime into a paste by slaking it in water, then mix the oil, and to the mixture add the gypsum, and heat up to 240° F. Use a large vessel, as grease contains water, and in boiling the water causes much frothing up. Do not continue the boiling too long or the viscosity will be lessened.

Waggon-Axle Grease.

Quicklime	5 lb.
Water	2 gallons.
Hard crude rosin oil	4 gallons.
Anthracene grease oil	5 gallons.

Slake the lime in the water and put through a sieve; into the paste thus made stir the crude rosin oil, and allow the mixture to stand for twelve hours, then pour off the supernatant water; into the thick mass stir the anthracene grease oil. Heat the compound

to 240° F., stirring the whole time until homogeneous, then allow the mixture to cool, when it is ready for use.

Mutton Tallow Substitute.

	Lb.
Cotton stearine	83
Oleine or oleo oil	29

Incorporate at very gentle heat.

Tram Grease.

A fine grease is made from 10 lb. "hard" rosin oil, 10 lb. ·885 mineral oil, and 10 lb. slaked lime.

Belt Grease in Sticks.

Take of pale rosin 65 parts, tallow 15, ceresin 10, neutral wool fat 20, oxidised cottonseed oil, 10 parts. The ingredients are melted in succession, and the mixture, when cooled down to a point at which it begins to set, is poured into parchment paper cylinders resting in a wooden or metal mould, or else into metal tubes corked at the lower end, the cooled mass being afterwards ejected by a wooden plunger, and wrapped in paper or foil.

Turbine Oil.

A mixture of Russian engine oil (viscosity 8·6, flashing point 212° C., and sp. gr. 0·912) with 10 per cent. of tallow, will furnish a grease suitable for water turbines.

Steam Turbine Oils.

A suitable oil for the main shaft of Laval and other high speed turbines is obtained by mixing Russian spindle oil (sp. gr. 0·910) with 50 per cent. of bone oil. For other parts of the turbine an oil may be prepared from Russian engine oil, sp. gr. 0·906-0·908, and 20 per cent. of tallow.

Motor Oil.

For small motors up to 10 h.p. Russian engine oil (sp. gr. 0·900-0·904), may be mixed with 5 to 10 per cent. of refined rape oil. The product is suitable for oiling all parts of the motor, including the cylinders. For heavier motors up to 300 h.p. Russian mineral oil of sp. gr. 0·912, viscosity about 8 (at 50° C.), and flashing point 212° C., may be used.

Motor Car Oil.

In the case of cars over 50 h.p. the last-named oil is useful, whilst for small cars an American mineral oil, with the sp. gr. 0·910, viscosity about 4, and flashing point 220° C., gives good results when used for cylinders and other working parts.

Oil for Centrifugal Separators.

These high-speed machines require a very fluid mineral oil (sp. gr. 0·900, flashing point 190° C.), the viscosity of which has been raised by an addition of 10 per cent. refined rape oil.

Spindle Oil.

Large spinners buy their oil in bulk from wholesale houses, but for small users an excellent oil may be prepared by mixing American spindle oil, sp. gr. 0·885, with 20 per cent. of refined rape oil, a preparation that is found to be preferred to the unmixed mineral oil, in spite of its higher cost.

Oil for Ball Bearings.

A great variety of oils can be used for shafts that are mounted in ball-bearings, but a very useful recipe consists of a mixture of American mineral oil (sp. gr. 0·900-0·908, viscosity 3·5 at 50° C., flashing point about 200° C.), and 20 per cent. of refined rape oil.

Heavy Lubricating Oil, No. 3.

	Qr.	Lb.
Lard oil	1	2
Olive oil	2	0
Cocoanut oil	1	0
·908 mineral oil	1	0

Heavy Engine Oil, No. 1.

	Qr.	Lb.
·908 mineral oil	2	16
Lard oil	1	0

Cycle Oil, A Blend.

	Cwt.
Sperm oil	1
Vaseline	1

Cycle Oil, B Blend.

	Cwt.
Sperm oil	2
Vaseline	1

Cycle Oil, C Blend.

	Cwt.
Sperm oil	3
Vaseline	1

Cycle Burning Oil, A Blend.

	Cwt.
Camphorated oil	2
Sperm oil	3
Mineral colza ·300	3

Put the sperm oil in jacket with vaseline or camphorated oil, just raise heat to 120° F., put air-pumps on for fifteen minutes, run in the mineral colza, crutch well for ten minutes, then pass through fine sieve and run into casks or drums.

Cycle Burning Oil, B Blend.

	Cwt.
Camphorated oil	2
Sperm oil	3
Mineral colza ·300	5

Cycle Burning Oil, C Blend.

	Cwt.
Camphorated oil	2
Sperm oil	3
Mineral colza ·300	7

Ordinary Boiled Oil.

	Tons.	Cwt.	Qr.	Lb.
Raw linseed oil	2	0	0	0
French rosin	0	2	0	0
Resinate of maganese	0	3	1	4

Pump oil in boiling pan, which must be jacketed or with steam coil, and with air-pumps turn on steam and start agitators; keep them full on for the first two hours until the heat is at 200° F. Now start air-pump and keep blowing air on for the next seven hours.

In the first two hours add the resinate of manganese and rosin, a little at a time (previously powdered). The oil after five hours' blowing should be a rich port colour, and ready to drop into the store tank after nine hours in all.

Common No. 1 Boiled Oil for Export.

	Tons.	Cwt.
Raw linseed oil	3	0
Resinate of maganese	0	1
Dark rosin	0	2
Best pine oil	0	2
Tea rose oil	0	1

The tea rose mineral oil is added when quite cold, and gradually.

Ordinary Pale Boiled Oil.

	Tons.	Cwt.	Qr.	Lb.
Best Baltic oil	1	10	0	0
Calcined magnesia	0	0	0	15
Zinc oxide	0	0	0	17
French pale rosin	0	5	0	0

Heat up to 300° F., then put blower on, keep on for ten hours; add French rosin and magnesia, etc., during the first two hours gradually, which must be prepared as follows: During the first two hours of the boiling put into jacket pan the rosin and run; when run thoroughly, mix into same the zinc oxide, and then pour, whilst still in liquid form, into the oil, after that is in add magnesia. Tank this for three weeks before sending out.

Boiled Linseed Oil for Export Grinding Colours.

	Tons.	Cwt.	Qr.	Lb.
Raw linseed oil	1	0	0	0
Mineral colza	1	0	0	0
Red lead	0	0	2	14
Resinate of manganese	0	1	2	0

The lead and manganese are boiled in the oil by fire, adding in small quantities at a time; heat up to 350° F., keeping agitators on the move all the time; when all are in raise up to 450° F.; keep at this for the next four hours, then draw off fire, pump into steam-pan, and turn on steam, and the blower or air-pump, add mineral colza

oil gradually; when all is in, keep on steam and air-pump for two hours, then drop into stock-tank below.

Boiled Oil Made for Calcutta.

	Tons.	Cwt.	Qr.
Raw linseed oil	3	0	0
Mineral colza	1	0	0
Resinate of manganese	0	3	2
Dark rosin	0	3	2

Run resinate of manganese and rosin together in jacket pan. When run have oil at 300° F. in steam-pan and pour the resinate in gradually; when all is in put on air-pump and keep up heat to 300° F. for five hours. Then let temperature drop down to 60° F. and add gradually the mineral colza, keep on blower and agitate for two hours longer and drop into tank.

Pale Boiled Oil No. 2.

	Ton.	Cwt.	Qr.	Lb.
Best linseed oil	1	0	0	0
Best pale French rosin . .	0	2	2	0
Zinc white	0	0	0	14
Magnesia	0	0	0	14

Heat up oil to 200° F. Then melt rosin in jacketed pan and mix in zinc white when thoroughly run, pour in gradually the resinate of zinc into the hot oil, then put on air-pump, and add magnesia, a little at a time; when all is run keep up heat to 300° F. for five hours, then drop into tank below.

The following books on oils contain much useful information:—

The Practical Compounding of Oils, Tallow and Grease for Lubrication. By an Expert Oil Refiner. Price 7s. 6d. net. Scott, Greenwood & Son. This book is full of formulæ and practical instructions for blending lubricating oils, greases and compositions.

Lubricating Oils, Fats and Greases. By George H. Hurst, F.C.S. Third revised edition. Price 10s. 6d. net. Scott, Greenwood & Son. Contains an excellent account of the different paraffin, petroleum, animal and vegetable oils used in the lubrication of machinery.

The Manufacture of Lubricants, etc. by R. Brunner, price 7s. 6d. net (Scott, Greenwood & Son) also deals with the subject.

SECTION VII.

CEMENTS, PASTES, GLUES AND OTHER ADHESIVE PREPARATIONS.

French Cement.

Make a thick mucilage with gum arabic and water, then add dextrine in fine powder to thicken it. A little lemon juice is sometimes added.

Starch Paste.

	Oz.
Corn starch	4
Cold water	8 fl.
Boiling water	64 fl. (½ gallon).

Beat up the starch in the cold water, until reduced to a creamy consistence, then pour the mixture into the boiling water and stir briskly until the white, semi-opaque mass becomes transparent. Should it fail to do so, place it over the fire, and boil until the desired result be obtained, stirring constantly.

Venetian Paste.

	Lb.	Oz.
(*a*) White or fish glue	0	4
Cold water	0	8 fl.
(*b*) Venice turpentine	0	2 fl.
(*c*) Rye flour	1	0
Cold water	0	16 fl. (1 pint).
(*d*) Boiling water	0	64 fl. (½ gallon).

Soak the 4 oz. of glue in the cold water for four hours; dissolve in a water-bath (glue-pot), and while hot stir in the Venice turpentine. Make up *c* into a batter free from lumps, and pour into *d*. Stir briskly, and finally add the glue solution. This makes a very strong paste, and it will adhere to a painted surface, owing to the Venice turpentine in its composition

Strong Adhesive Paste.

(*a*)	Rye flour	4 lb.
	Cold water	½ gallon.
(*b*)	Boiling water	1½ gallons.
(*c*)	Pulverised rosin	2 oz.

Make the flour into a batter with the cold water, free from lumps, then pour into *b*. Boil if necessary, and while hot stir in the pulverised rosin, a little at a time. This paste is exceedingly strong and will stick heavy wall-paper or thin leather. If the paste be too thick, thin with a little hot water. Never thin paste with cold water.

Paste That Will Not Sour.

Four parts by weight of glue are allowed to soften in 15 parts of cold water for some hours, and then moderately heated till the solution becomes quite clear; 65 parts of boiling water are now added with stirring. In another vessel 30 parts of starch paste are stirred up with 20 parts of cold water, so that a thin milky fluid without lumps is obtained. Into this the boiling glue solution is poured, with constant stirring, and the whole is kept at the boiling temperature. After cooling, 10 drops of carbolic acid are added to the paste. The paste must be preserved in close bottles to prevent evaporation of the water, and will in this way keep good for years.

Non-Putrefactive Adhesive.

Bernard and Puaux prepare a pale, extra strong, and non-putrefactive adhesive by boiling a 100 parts of white starch to a paste with 750 parts of water, and mixing the same, first with a hot solution of 150 parts of white dextrine in 250 parts of water, and then with a hot solution of glue (100 parts to 400 parts of water) the whole being diluted with 1,000 parts of cold water, stirred in by degrees. The product thickens and turns light coloured at the end of several hours, and is preserved from putrefaction by the addition of an antiseptic in suitable amount. The presence of the dextrine keeps it liquid, so that it can be used without having to be heated, whilst the adhesive power is greater than that of starch paste; it distributes evenly without lumps, resists moisture, and will keep indefinitely.

Label Paste.

A good paste for labels, suitable for bottles, may be made by soaking glue in strong vinegar, then boiling up and adding flour. This is very adhesive, and will not decompose when kept in wide-mouthed bottles.

Stick Cement.

	Lb.
Shellac	21
Venice turps	15
Rosin	5¼

Run down together and mould into pencils.

Directions for use.—Melt the cement with a match and apply to the warmed edges of the broken article, then press together.

Another style of stick cement, usually sold by stationers, is ordinary shellac cast into sticks like sealing-wax and broken into 2-inch pieces. It is not so elastic as the above.

Rosin Cement.

Melt together carefully 2 oz. best pale rosin, 1½ drams of Canada balsam, ½ oz. refined beeswax, and ¼ oz. camphor. Beat the whole for five to ten minutes after the ingredients have become completely mixed, then pour into stone jars or bottle. Melt by heating when required for use.

French Elastic Cement.

Take any convenient quantity of scraps of India-rubber, free from sulphur, *i.e.*, of pure rubber, not the vulcanised sort, and heat them gently in an iron vessel at the lowest temperature that will suffice to melt them, and stir occasionally until quite fluid. If the rubber is very old, a few minims of boiled linseed oil may be added now and then. When the whole is liquefied, sift in slowly some finely powdered hydrate of lime, stirring the mixture constantly, until it is perfectly homogeneous, and has acquired a dough-like consistence, but is not too stiff. Transfer in suitable portions to a mortar, and knead well with vermilion, ivory black, chrome green, or other colouring matter in fine powder, until the cement is of the colour desired, and of the consistency of stiff putty. It is used by warming a portion, and applying it to the glass cell and slide, both previously

warmed, in the usual manner, some little pressure being applied until the whole has been quite cold for some hours. This cement being somewhat elastic, and never getting quite hard, is especially suitable for the cells of objects mounted in fluid.

Cement Impervious to Oil.

A cement impervious to oil, and therefore useful to mend kerosene lamps, is made by taking 3 parts of rosin boiled with 5 parts of water and 1 of caustic soda. Mix with half its weight of plaster of Paris. This sets in one hour.

Paste.

An approved method of making paste is as follows: Take wheaten flour and mix in cold water to the consistency of thick cream; then boil it until it is glutinous. This ought to keep satisfactorily for a long time if not exposed to the air, but a little powdered alum added before boiling will have the effect of a preservative as well as giving strength to the paste.

Paste for Mounting Photos.

A capital paste for mounting photos may be made by mixing common starch with cold water to a thin cream, and pouring on to it just sufficient boiling water to bring it to a jelly. This will not keep and must be freshly mixed each time it is required.

Strong Office Paste.

Flour from wheat 1 lb., gum arabic (not ghatti) 12 oz., gum tragacanth 3 oz., salicylic acid ½ oz., cloves (oil of) liquid ½ oz., water 1¼ gallons. Heat the water, then dissolve the gums in part of it. Make a batter of the flour with another portion of the water. Stir well and mix with the gum water: then add the acid and cloves dissolved in water, and just bring to the boil together and strain while hot.

Very Strong Paste.

Water 1 gallon, flour 2¼ lb., rice flour 1½ lb., alum 4 oz., oil of cloves ¼ oz. Mix flours in one-half the hot water to a batter and dissolve alum in the other half of the water. Add acid, boil ten minutes, and add oil of cloves while getting cool.

Cheap Strong Paste.

White dextrine 4 lb., carbonic acid liquid ½ oz., cloves ½ oz., pure (fair) water 1 gallon. Mix dextrine with water; heat but not to the boil. Stand to cool for three days. Stir in acid and cloves and fill out.

Paste Preservatives and Bases.

The following are used as preservatives for paste: Hydronaphthol, salicylic acid, formalin, creosote oil, oil of cloves, alum, nitric acid, borax, lime water, thymol; whilst the basis can be flour (wheaten), rice flour, fish flour, starch, dextrine, glucose, gelatine and glycerine, in conjunction, of course, with water.

Elastic or Pliable Paste.

		Oz.
(*a*)	Common starch	4
	White dextrine	2
	Cold water	10 fl.
(*b*)	Borax	1
	Glycerine	3 fl.
	Boiling water	64 fl. (½ gallon).

Beat to a paste the ingredients given under *a*. Dissolve the borax in the boiling water, then add the glycerine, then pour the *a* mixture into a solution of borax. Stir until it becomes translucent. This paste will not crack, and, being very pliable, is used for paper, cloth leather, and other material where flexibility is required.

Flour Paste.

		Lb.	Oz.
(*a*)	Wheat flour	2	0
	Cold water	0	32 fl. (1 quart).
(*b*)	Alum	0	1
	Hot water	0	4 fl.
(*c*)	Boiling water	0	96 fl. (¾ gallon).

Work the wheat flour into a batter free from lumps with the cold water. Dissolve the alum as designated in *b*. Now stir *a* into *c*, and, if necessary, continue boiling until the paste thickens into a semi-transparent mucilage, after which stir in the solution *b*. The above makes a very fine paste for wall-paper.

Mastic Cement.

Take 60 lb. of slaked lime, 35 lb. of sand, 31 lb. of litharge, and 1 gallon of genuine boiled linseed oil. Knead these and thoroughly incorporate them into a stiff paste.

American Cement.

	Parts by Weight.
India-rubber	10
Chloroform	6
Mastic	2

This cement is good for making glass adhere to other hard surfaces.

Acid-Proof Cement.

Very useful for connections of acid tanks, etc., in chemical work; will withstand boiling acids.

	Lb.
Pure raw rubber	18
Litharge	$2\frac{1}{2}$
Tallow	$1\frac{3}{4}$
Slaked lime	1

Shred the rubber and melt with the tallow (or linseed oil may be substituted), well stir, then add the lime in dry powder, making into a paste; previous to use, mix up with litharge and apply to the joints. Allow to dry before contact with the corrosive fluids.

Acid-Proof Cement.

A paste is prepared with asbestos 1 part, sand 1 part, and sodium silicate 6 to 8 parts. The sand should be as fine as possible, and the sodium silicate of about 30° B. strength. The mass sets hard in the air, and then will resist the action of acids and heat.

Acid-Resisting Cement.

The following formula has been suggested for an acid-resisting cement for tanks, floors, etc. Silicate of soda (water-glass) 6 parts, glycerine 1 part, red lead $3\frac{1}{2}$ parts, fine cinders 10 parts. The silicate of soda and glycerine are mixed, and then the red lead and cinders added to make a mass like putty. This cement soon sets or

hardens, and when heated to the temperature of boiling water, unites with brick or Portland cement to form a strong joint.

White Cement.

	Parts by Weight.
Acetate of lead	46
Alum	46
Gum arabic	76
Wheat flour	500

Dissolve the acetate of lead and the alum in a little water and separately dissolve the gum arabic in a fair quantity of boiling water. Thus, if the 500 parts of wheat flour represent a pound, the quantity of water needed will be about a quart. The gum having dissolved, add the flour, put the whole on the fire, stir well with a wooden stick, then add the solution of lead acetate and alum. Continue the stirring in order to avoid the formation of lumps, then take it off the fire without allowing it to boil. This cement is used cold, and will not scale. It is very useful in making wood, glass, cardboard, etc., adhere to metals, and is extremely strong.

Waterproof Cement.

	Parts by Weight.
Bichromate of potash	8
Gelatine size	11
Alum	1

Dissolve the gelatine in a little water, then add the bichromate of potash and the alum. This glue or cement resists water at all temperatures.

Waterproof Cement.

Shredded gutta-percha, 25 parts, melted and mixed with 75 parts ground pumice-stone; this is then combined with 150 parts of Burgundy pitch, and the whole melted together.

Rubber Cement.

A cement for uniting India-rubber is composed as follows: 100 parts of finely chopped rubber, 15 parts of rosin, 10 parts of shellac; these are dissolved in bisulphide of carbon.

Cement for Tyres.

	Oz.
Isinglass	$\frac{1}{2}$
Gutta-percha	$\frac{1}{2}$
Caoutchouc	1
Carbon bisulphide	4 fl.

Mix and dissolve.

Cement for Tyres.

	Oz.
Shellac	2
Gutta-percha	2
Red lead	$\frac{1}{4}$
Sulphur	$\frac{1}{4}$

Melt the shellac and gutta-percha, and add with constant stirring the red lead and sulphur, melted. Use while hot.

Cement for Tyres.

	Oz.
Crude rubber	$\frac{1}{2}$
Carbon bisulphide	4

Macerate twenty-four hours, and then add a solution of:—

	Oz.
Rosin	1
Beeswax	$\frac{1}{4}$
Carbon bisulphide	4

Cement for Tyres.

	Oz.	Gr.
Caoutchouc	2	0
Rosin		140
Shellac		100
Carbon bisulphide		*q.s.*

Use a sufficient quantity of the carbon bisulphide to dissolve the other ingredients.

Cement for Tyres.

Rough rubber, 20 parts; rosin, 10 parts; Venetian red, 10 parts; tallow, 5 parts. Melt the rubber over a fire, then add the rosin and the tallow and lastly the red.

Cement.

Take of clear gum arabic, 2 oz.; of fine starch, 1½ oz.; and of white sugar, ½ oz. Reduce the gum arabic to powder, and dissolve it in as much water as the laundress would use to render 1½ oz. of starch fit for use. Dissolve the starch and sugar in the gum solution. Then place the mixture in a vessel, and plunge the vessel itself into boiling water, and let it remain there until the starch becomes clear. The cement should be as thick as tar, and remain so. It can be kept from spoiling by dropping in a lump of camphor, or a little oil of cloves or sassafras. This cement is said to be very strong, and will cause glazed surfaces to adhere perfectly. It is useful for preparing specimens of rocks, minerals, or fossils that may have been accidentally broken.

Cement for Steam-pipes.

A cement of specially valuable properties for steam-pipes, in filling up small leaks, such as a blow-hole in a casting, without the necessity of removing the injured piece, is composed of 5 lb. of Paris white, 5 lb. yellow ochre, 10 lb. litharge, 5 lb. red lead, and 4 lb. black oxide of manganese, these various materials being mixed with great thoroughness, and made into a paste with a small quantity of asbestos and boiled oil. The composition, as thus prepared, will set hard in from two to five hours, and possesses the advantage of not being subject to expansion and contraction to such an extent as to cause a leakage afterwards, and its efficiency in places difficult of access is of special importance.

Cement for Marble.

Stir to a thick batter with silicate of soda 12 parts Portland cement, 6 parts slaked lime, 6 parts fine white lead, 1 part infusorial earth. This is very excellent for marble and alabaster. The cemented objects need not be heated. After twenty-four hours the fracture is firm, and the place can with difficulty be found.

Lute for Steam Joints.

Genuine white lead ground in oil to a stiff paste (keep under water). Mix intimately with about a quarter its weight of dry genuine red lead when required for use.

Acid-Proof Cements for Stoneware and Glass.

1. Mix with the aid of heat equal parts of pitch, rosin, and plaster of Paris.

2. Make silicate of soda to a paste with ground glass.

3. Make boiled oil to a paste with china clay and white lead.

4. Make coal-tar to a paste with pipeclay.

5. Make boiled oil to a paste with quicklime.

6. Mix with the aid of heat, sulphur, 100 lb.; tallow, 2 lb.; rosin 2 lb. Thicken with ground glass.

7. Mix with the aid of heat, rosin, 2 lb.; sulphur, 2 lb.; brick-dust, 4 lb.

8. Mix with the aid of heat, 2 lb. of India-rubber and 4 lb. of boiled oil. Thicken with 12 lb. of pipeclay.

9. Fuse 100 lb. of India-rubber with 7 lb. of tallow. Then make to a paste with dry slaked lime and finally add 20 lb. of red lead.

10. Mix with the aid of heat, rosin, 24 lb.; red ochre, 8 lb.; boiled oil, 2 lb.; plaster of Paris, 4 lb.

Waterproof Cements for Glass, Stoneware, and Metals.

1. Make a paste of sulphur, sal ammoniac, iron filings, and boiled oil.

2. Mix together dry, whiting, 2 lb.; plaster of Paris, 3 lb.; sand, 3 lb.; litharge, 3 lb.; rosin, 1 lb. Make to a paste with copal varnish.

3. Make a paste of boiled oil, 6 lb.; copal, 6 lb.; litharge, 2 lb.; white lead, 1 lb.

4. Make a paste with boiled oil, 6 lb.; brickdust, 2 lb.; dry slaked lime, 1 lb.

5. Dissolve 93 oz. of alum and 93 oz. of sugar of lead in water to concentration. Dissolve separately 152 oz. of gum arabic in 25 gallons of water, and then stir in 62½ lb. of flour. Then heat to a uniform paste with the metallic salts, but take care not to boil the mass.

6. For iron and marble to stand heat. In 3 lb. of water dissolve first 1 lb. of waterglass, and then 1 lb. of borax. With the solution mix 2 lb. of clay and 1 lb. of barytes, first mix dry, to paste.

Cement for Glass.

To make cement for mending glass or china without leaving black marks, mix up 1½ oz. gum sandarac, 1½ oz. white shellac, and ½ gill methylated spirit.

Cement (Quick Setting) for Glass.

Take equal parts of genuine dry English white lead (Dutch process) and genuine dry English red lead. Thin these down after dry mixing to a pasty consistency with japanners' gold size at the moment of application, making sure that the white and red lead are well mixed with the vehicle.

Adhesive Plaster for Glass.

Thirty parts of rosin oil, 40 parts of Maracaibo copaiba balsam, 20 of larch turpentine, 40 of pale rosin, and 12 parts of wax are melted together and strained into a wide-necked bottle, in which they are dissolved in 600 parts of ether by stirring. This solution is employed to dissolve 100 parts of Para rubber in shreds, in a closed vessel with occasional stirring, the final solution being thinned down with ether, so as to give a total weight of 800 parts. The cold mass is applied to a closely woven cotton fabric, in a gumming machine, the prepared fabric being finally cut into strips.

Cement for Fountains and Cisterns.

Mix ground brick (sifted), 9 lb.; litharge, 4 lb.; linseed oil, sufficient to make a stiff paste. Takes six hours to set.

Impregnation of Wood with Cement.

This coating is used only on rough, unplaned timber, and no more is prepared at one time than can be applied in thirty minutes. The mixture is made as follows: 10 lb. Portland cement, 20 lb. fine floated sand, 10 lb. fresh cottage cheese and 1 gallon buttermilk are intimately mixed, and it must be continually stirred during application. Must not be laid on too stout, and as soon as first coat is dry a second coat should be given. Over this coating a good green colour, ground in oil and thinned with boiled oil and a portion of varnish, may be applied, and it is asserted that wood so protected will positively resist all influences of atmospheric changes and conditions.

To Prevent Glue from Cracking.

The cracking of glue, which frequently occurs when glued objects become very dry, or are subjected to the heat of a stove, may be

prevented, it is said, by the addition of chloride of sodium to the glue, which prevents its drying so completely as to become brittle. Glue thus treated will adhere to glass, metals, etc., and can be employed for affixing labels to bottles.

Glue Paste or Mucilage.

Place 5 lb. of potato starch in 6 lb. (3 quarts) of water, and add ¼ lb. of pure nitric acid. Keep it in a warm place, stirring frequently for forty-eight hours. Then boil the mixture until it forms a thick and translucent substance. Dilute with water, if necessary, and filter through a thick cloth.

Opticians' Cement.

Melt wax 1 oz., and rosin 15 oz., then add whiting 4 oz., previously made red-hot, and still warm.

Jewellers' Cement.

Dissolve over the water-bath 50 parts of fish glue in a little strong spirits of wine, add 4 parts of gum ammoniac, separately dissolve 2 parts of mastic in 10 parts of spirits of wine. Mix the two solutions and keep them in well-stoppered bottles. In order to use this it must be warmed over the water-bath.

American Cement for Jewellers.

Soak 8 oz. of isinglass in 64 oz. of water for twenty-four hours, then evaporate in the water-bath; to 32 oz. add 32 oz. of rectified spirits of wine, and strain. Then mix in a solution of 4 oz. of mastic and 2 oz. gum ammoniac in 32 oz. of rectified spirit.

Cutlers' Cement.

Black rosin, 4 lb.; beeswax, 1 lb.; melt, then add 1 lb. of finely powdered and well-dried brickdust.

Cement, Electrical and Chemical.

Rosin 5 lb.; wax and dry red ochre in fine powder, of each 1 lb.; plaster of Paris, 4 oz.; melt the first two, then add the ochre, and lastly the plaster. Mix well together.

Armenian Cement

This article, so much esteemed for uniting pieces of broken glass, for repairing precious stones, and for cementing them to watch cases and other ornaments, is made by soaking isinglass in water, until it becomes quite soft, and then mixing it with spirit in which a little gum mastic and ammoniacum have been dissolved.

ime-Balsam Cement.

Warm some Canada balsam of good quality, and add gradually, while fluid, about ¼ or ⅓ part of finely powdered dry hydrate of lime, stirring until homogeneous.

Cements for Leather, India-Rubber, etc.

1. Fuse together shellac and gutta-percha in equal weights.

		Oz.
2.	India-rubber	8
	Gutta-percha	4
	Bisulphide of carbon	32

		Oz.
3.	India-rubber	5
	Gum mastic	1
	Chloroform	3

		Oz.
4.	Gutta-percha	16
	India-rubber	4
	Pitch	4
	Shellac	1
	Linseed oil	1

5. Mix 1 oz. of turpentine with 10 oz. of bisulphide of carbon in which as much gutta-percha as possible has been dissolved.

6. Amalgamate by heat:—

	Oz.
Gutta-percha	100
Venice turpentine	80
Shellac	8
India-rubber	2
Liquid storax	10

7. Amalgamate by heat:—

	Oz.
India-rubber	100
Rosin	15
Shellac	10

Then dissolve in bisulphide of carbon.

8. Make the following solutions separately and mix:—

		Oz.
(*a*)	India-rubber	5
	Chloroform	140
(*b*)	India-rubber	5
	Rosin	2
	Venice turpentine	1
	Turpentine	20

Cement for Leather Belting.

Common glue and isinglass, equal parts, are soaked for ten hours in just enough water to cover them. The mixture is then raised to a boil, and pure tannin is added till the whole becomes ropy, like the white of an egg. The surfaces to be joined are cleaned, coated with the cement, and clamped together till dry

Chinese Cement.

Shellac dissolved in alcohol. Used for joining wood, earthenware, glass, etc.

Cement for Turned and Bored Joints.

1 lb. of white lead, 1 lb. of red lead. Mixed with boiled linseed oil to the proper consistency.

Cement to Fix India-rubber on Metals.

Dissolve 1 part of gum lac in 10 of cold liquid ammonia. This will take a month or so to effect. The solution allows the face of the India-rubber to be softened, so that it may be applied to metals, wood, etc. When the ammonia evaporates the India-rubber hardens and adheres firmly to the metal.

Cements for Metals.

Several cements are used to make metals adhere either to wood or glass. We give two much used recipes:—

	Parts by Weight.
1. Boiled linseed oil	6
Copal	6
Litharge	2
Powdered white lead	1

Mix all thoroughly together.

	Parts by Weight.
2. Slaked lime	1
Brickdust	2
Boiled linseed oil	3

All that is needed is to make a thoroughly homogeneous mixture of the ingredients.

Cement for Filling Faults in Castings.

Iron filings, free from rust, 10 lb.; sulphur, ½ lb.; sal ammoniac, ¾ lb. These are mixed with water to a thick paste, which is rammed into the "faults". This becomes strong when the iron filings are rusted. The parts which have to be cemented are treated before the operation with liquid ammonia, so as to be perfectly free from grease.

Cement for Glass and Metal.

Brass letters on glass windows often tumble off from unequal expansion or from the too energetic efforts of window cleaners. The following recipe will be found useful.

	Parts.
Litharge	2
White lead	1
Boiled linseed oil	3

Mixed just before using.

Cement for Zinc.

Make whiting and zinc-dust to a paste with waterglass.

Cements for Iron.

	Lb.
1. Graphite	50
Whiting	15
Litharge	15

Make to a paste with boiled oil.

2. Make a putty of white lead and asbestos.

3. Make a paste of litharge and glycerine. Red lead may be added. This also does for stone.

4. Make a paste with boiled oil of equal parts of white lead, pipe-clay, and black oxide of manganese.

5. Make iron filings to a paste with waterglass.

		Oz.
6.	Sal ammoniac	4
	Sulphur	2
	Iron filings	32

Make as much as is to be used at once to a paste with a little water. This remark applies to the two following dry recipes.

		Oz.
7.	Iron filings	160
	Lime	80
	Red lead	16
	Alum	8
	Sal ammoniac	2

		Oz.
8.	Clay	10
	Iron filings	4
	Salt	1
	Borax	1
	Black oxide of manganese	2

9. Mix :—

	Oz.
Iron filings	180
Lime	45
Salt	8

10. Mix :—

	Oz.
Iron filings	140
Hydraulic lime	20
Sand	25
Sal ammoniac	3

Both of these two last mixtures are made into a paste with strong vinegar just before use.

11. Make equal weights of zinc oxide and black oxide of manganese into a paste with waterglass.

Brunswick Cement.

Divide any convenient quantity of the best Brunswick black into two equal parts. Evaporate one portion slowly with a stir now and then, until it becomes thick and pasty. Rub down with a glass muller, or with a pestle and mortar, enough ivory black with the other portion to render this thick and pasty also, add this to the former portion while it is still warm, work well together, adding, towards the last, a few drops per oz. of gold size. This makes an excellent black cement for general work with either glass, wood or paper.

Cement to Withstand Petroleum.

Gelatine (glue) mixed with glycerine forms a compound which can be liquefied by heating, but which solidifies on cooling and forms a tough, elastic solution, having somewhat the appearance and character of India-rubber. This compound is entirely insoluble in petroleum or benzine, and any vessel coated or painted with it becomes impervious to these liquids.

Fire-proof Cements.

1. Iron filings, 140 parts; hydraulic lime, 20; quartz sand 25; sal ammoniac, 3. These are formed into a paste with vinegar, and then applied. This cement is left to dry slowly before heating.

2. Iron filings, 180 parts; lime, 45; common salt, 8. These are worked into a paste with strong vinegar. The cement must be perfectly dry before being heated. By heating it becomes stone hard.

Cement for Celluloid.

	Oz.
Shellac	2
Spirits of camphor	2
90 per cent. alcohol	6 to 8

China Cement.

Dry white lead and copal varnish, ground together on a slab with a muller, form a very tenacious cement, and one which resists the action of water. It is also more adhesive than ordinary white lead and oil, and may be employed successfully for mending broken

mortars and pestles if sufficient time is allowed for the cement to thoroughly harden.

White China Cement.

About equal parts of syrupy silicate of soda solution (water glass) and oxide of zinc are rubbed together with a palette knife to a thick cream. This cement must be mixed in small quantities immediately before use, as it will not keep when mixed. This makes a good cement for photographic dishes, especially if the joint is afterwards painted with a little shellac varnish to keep out moisture. It is not proof against hot water, but more so than the cements made from isinglass. By mixing suitable pigments with the oxide of zinc the cement may be coloured to match the article which is being mended. The following may be used: for blue, cobalt blue; for red, vermilion; for orange, red lead; for black, manganese dioxide; for yellow, ochre; for dark red, oxide of iron; for dark green, oxide of chromium; for light green, carbonate of copper.

Isinglass China Cement.

This is one of the most generally useful cements, and keeps well if loosely corked: isinglass, 1 dram; water, ½ oz.; acetic acid, ½ oz. Steep the isinglass in the water until soft, then add the acid, and warm the bottle in a vessel of hot water, stirring the mixture until it is smoothly mixed.

Sealing-Wax China Cement.

About equal parts of syrupy silicate of soda solution (soluble glass) and oxide of zinc are rubbed together with a palette knife to a thick cream. This cement must be mixed in small quantities immediately before use, as it will not keep when mixed.

China Cement.

Ordinary white lead ground in oil, as used by plumbers, makes a useful china cement, but takes some time to become thoroughly hard. It should not be used for culinary vessels.

Egg Cement.

White of egg thickened with finely powdered quicklime. Used to mend earthenware, glass, china, marble, alabaster, spar ornaments, etc. It does not resist moisture.

Egg and Lime China Cement.

Powdered quicklime (sifted), white of egg. These two substances are ground together with a palette knife, and used immediately as the cement will not keep. It is a very powerful cement, and useful for mending statuary or porcelain. If good quicklime is not available oyster-shells may be heated to redness in a bright fire, and powdered when cold.

Casein Cements.

For Metals.—Make a paste with 16 oz. casein, 20 oz. slaked lime, and 20 oz. of sand, in water.

For Glass.—1. Dissolve casein in a concentrated solution of borax.

2. Make a paste of casein and waterglass.

Putties.

Grind 10 lb. of whiting and 1 lb. of white lead to a stiff paste with boiled oil. The white lead may be omitted.

French Putty.—Boil 7 lb. of linseed oil with 4 lb. of burnt umber for two hours. Then add 10 lb. of white lead and 5½ lb. of chalk.

Wax Putty.—Fuse together 4 lb. of yellow wax, 2 lb. of tallow, 1 lb. of oil of turpentine, and 6 lb. of Venice turpentine.

For Horn and Bone.—Mastic, 5 lb.; turpentine, 2 lb.; linseed oil, 6 lb.

Cement for Bottle Tops.

Melt together gelatine and glycerine.

Cutlers' Cements for Fixing Knife Blades into Handles.

		Lb.
1.	Rosin	4
	Beeswax	1
	Plaster of Paris or brickdust	1

		Lb.
2.	Pitch	5
	Wood ashes	1
	Tallow	1

Waterproof Gelatine Paper.

The paper is coated on both sides with a solution consisting of 1 part gelatine, 4 parts water, and 1 part glycerine. Coagulate the gelatine by immersing the paper in a solution of 750 c.cm. of formal in 5 litres of water. The paper thus treated is, after drying, impervious even to steam.

Fire- and Acid- Proof Cement.

A mixture of asbestos powder with 3 or 4 times its weight of sodium silicate (waterglass) solution of 30° B. density forms a plastic paste, but shrinks too much in drying to be used alone. However, this may be remedied by incorporating a quantity of fine white sand, equal in amount to the asbestos used, with the mass, the plasticity of which is at the same time preserved. This cement, if dried in the air, will soften and fall apart under the action of water, but become hard on being brought into contact with strong mineral acids without suffering any corrosion, owing apparently to the composition of part of the waterglass, and the consequent deposition of finely divided silica which increases the cementing power. In this condition the mass is no longer soluble in water, nor is it affected by strong heat, being able to stand the heat of the Bunsen flame for half a day without exhibiting any tendency to sinter. The cement must always be freshly prepared since it hardens within a few days, and even in less time if potassium silicate be used in place of sodium compound.

Mucilage for Labels.

Macerate 5 parts of good glue in 18 to 20 parts of water for a day, and to the liquid add 9 parts of rock candy, and 3 parts of gum arabic. The mixture can be brushed upon paper while lukewarm, it keeps well, does not stick together, and when moistened adheres firmly to bottles. For labels of bottles it is well to prepare a paste of good rye flour and glue, to which linseed oil, varnish, and turpentine have been added in the proportion of ½ oz. of each to the pound. Labels prepared in the latter way do not fall off in damp places.

Brushmakers' Cement.

Rosin	20 lb.
Rosin oil or spirit	1 gallon.

Reduce the rosin to small pieces, run down in a pot, add the other ingredient and stir until mixed and syrupy; then run out into tins. Brushmakers are in the habit of making this in the workshop, but would be glad to buy it if it were on sale. It is used by them to cement the bristles in the stocks, also for the string binding on sash tools, etc.

Enamel Cement.

Dissolve 1 part of best dammar in 4 or 5 parts of 95 per cent. benzol, and grind some of the best dry white lead or flake white with this, until an even mixture is obtained of about the same consistence as that ground in oil for artists' use. Add 2 parts of camphorated balsam, and warm the whole together.

Cement for Electrical Apparatus.

Take 1 lb. of beeswax added to 5 lb. of rosin, 1 lb. of red ochre, and 2 tablespoonfuls of plaster of Paris, all mixed together. It will make an excellent composition for electrical uses, but a cheaper one for cementing voltaic plates into wooden troughs is made with 6 lb. of plaster of Paris and $\frac{1}{4}$ of a pint of linseed oil. The ochre and the plaster of Paris should be well dried, and added to the other ingredients when these are in a melted state.

Electrical Amalgam.

Zinc and tin, 1 oz. each; quicksilver, 2 oz.; melt the first two in an iron ladle, then withdraw it from the fire and add the mercury, also made hot; stir well together with an iron rod, pour the melted metal into a wooden box and shake it violently until cold. It should be preserved in a corked glass phial.

Cements for Glass and Metal, for Electrical Apparatus, etc.

	Oz.
1. Rosin	5
Beeswax	1
Red ochre	1

Amalgamate by heat.

2. Boil together 3 oz. of rosin, 1 oz. of caustic soda, and 5 oz. of water. Then make to a paste with plaster of Paris.

3. Make a mixture of mucilage of gum arabic and calomel.

		Lb.
4.	Litharge	2
	White lead	1
	Copal	1
	Boiled oil	3
		Oz.
5.	Copal varnish	15
	Boiled oil	5
	Turpentine	2
	Glue made as strong as possible	5
	Dry slaked lime	10

6. Fuse 2 lb. of pitch and stir in 1 lb. of plaster of Paris.

Russian·Steam Glue.

100 parts of a good quality of glue, 100 to 110 parts of warm water, and 5·5 to 6 parts of commercial nitric acid of 36° B.

Liquid Glue.

A liquid glue, which is always ready for use and keeps any length of time, is made by dissolving 60 lb. of borax in 10 gallons of water, adding to the solution when boiling 4 lb. of 90 per cent. pearlash, and adding the mixture while boiling to 145 gallons of hot glue liquor, showing a density of 12° B.

Liquid Glue.

2 oz. of borax are dissolved in 1 gill of boiling hot water, and while this is kept boiling 1 oz. pearlash is added; this solution is then stirred into a boiling solution of 1 lb. animal glue and 1 quart of water. If too heavy, it may be thinned with hot water. Will not sour or mould.

Liquid Glue.

Liquid glue is made by adding a little dilute nitric acid to hot glue made in the ordinary way. If too much acid is used the glue will never set. Suitable proportions are 100 parts of glue, 200 parts of water, and 12 parts of nitric acid of 36° B.

Liquid Glue.

100 parts of glue, 140 parts of water, and 16 parts of nitric acid of 36° B. Soak the glue in cold water, then pour the necessary

quantity of warm water over it, and heat gently on a water-bath until all the glue is dissolved. Next add gradually the nitric acid with constant stirring, and to the Russian steam glue 6 parts of finely pulverised sulphate of lead, which will impart to it the white colour.

Glue to Resist Boiling Water.

Dissolve separately in water 55 lb. of glue, and a mixture of 4 lb. of bichromate of potash, and 5 lb. of alum. Mix together in proper proportions just before use.

Chinese Glues.

1. Dissolve shellac in ten times its weight of ammonia.
2. Make a paste of 40 oz. of dry slaked lime, 10 oz. of alum and 50 oz. of white of egg.

Gunsmith's Glue.

A good glue for the gunsmith is made by dissolving 4 oz. of good glue in 16 oz. of strong acetic acid by exposure to gentle heat. This is not exactly a liqu d glue preparation, it is only semi-liquid. It may be kept for any length of time desired, and, when wanted for use, a slight warming up is all that is necessary.

Waterproof Glue.

Dissolve ½ oz. each of gum sandarac and mastic in 8 fl. oz. of strong alcohol (or methylated spirit), to which add ½ oz. of turpentine. Put the dissolved gums into a double glue-pot, add by degrees a hot thick solution of glue to which isinglass has been added; stir the whole until all the ingredients are thoroughly incorporated. Next strain through a cloth while hot, and it is ready for use. It should be used quite hot.

Waterproof Glue.

Take of shellac 3 parts; India-rubber, 1 part by weight. Dissolve each separately in ether free from alcohol. It is best to do this in stoppered bottles and without heating, as the ether readily evaporates. When solution is complete mix the two, and keep well stoppered for use.

Marine Glue.

Marine glue is made by dissolving India-rubber in coal-tar naphtha, and adding to it powdered shellac until it is of the proper thickness. It is always applied hot, and is very adhesive under water. Fine shreds of India-rubber, dissolved in warm copal varnish, also make a waterproof cement for wood and leather.

Marine Glue.

Caoutchouc, 1 part; coal-tar naphtha, 3 parts. After leaving the rubber for four days in contact with the naphtha, decant, and dissolve therein by the aid of heat 3 parts of shellac; run into moulds. It solidifies on cooling. Used to join wood and render vessels water-tight.

Marine Glue.

Make a very strong solution of India-rubber, 2 oz., and asphalt, 4 oz., in benzol or naphtha.

Glue Substitute for Use in the Tropics.

A repairer of organs and pianos in Asunçion, Paraguay, has informed the U.S. Consul there that the substitute used by continental organ manufacturers is a composition of pitch and wax. This man employs pitch and wax as a substitute for glue in sticking leather and felt on wood in all his repair work, and says that in his experience it has proved to be a most effective composition. For seating organ valves, the composition of wax and pitch is said to be very satisfactory. It is said that the leather will never harden, but will remain pliable yet firm, and seat itself securely against the reed opening. The composition is melted in a glue pot, and will be hard or soft according to the proportion of wax used. The exact proportion may be determined by a few experiments. Either white or yellow wax may be used in the composition.

Fish Glue Preparations (Stickum).

(1) Dissolve 1 lb. best fish glue in 1½ pints of water, add 1 pint vinegar; ready for use at any time without warming.

(2) Dissolve 33 lb. of best fish glue in 3½ gallons of water, then add gradually with constant stirring 3 lb. of nitric acid, or enough to prevent the glue from hardening on cooling.

(3) Dissolve 1 lb. of powdered alum in 12 gallons of water, then add 120 lb. of fish glue, 10 lb. of acetic acid, and 40 lb. of alcohol and digest.

Liquid Glue Size.

10 lb. gelatine of low quality are dissolved with 6 to 8 oz. oxalic acid, in 4 gallons of water, the whole heated by steam for five to six hours, diluted in a porcelain vessel, neutralised with lime, and evaporated at a gentle heat, when twice the weight of the gelatine employed is obtained of a clear slightly coloured size, which can be easily kept.

Glue for Inlaying or Veneering.

Get the best glue, known by its transparency, and of rather a light brown colour, free from clouds and streaks; dissolve it in water, and to every quart add 1 oz. of isinglass and 1 gill of the best vinegar.

Mouth Glue.

Best cake glue *q.s.*, dissolve in a little water, add brown sugar, a small quantity, and some essence or juice of lemons, pour it into greased moulds, and dry it. When used it is wetted with the tongue and rubbed on the paper to be joined.

Solution for Mounting Photographs without Cockling.

	Oz.
Nelson's No. 1 photo. gelatine	4
Water	16
Glycerine	1
Methylated alcohol	5

Dissolve the gelatine in the water, then add the glycerine and lastly the spirit.

Solution for Making Paper Adhere to Metal.

	Lb.
Tragacanth	$2\frac{1}{2}$
Gum arabic	$7\frac{1}{2}$
Water	3 gallons.

Sticking Brass Labels to Tins.

For sticking thin brass labels on to lobster tins, use a fresh mixture in equal parts of a strong solution of zinc chloride and zinc

oxide to cement the stamped metallic band to the tin; a saturated solution of shellac in borax might also be suitable.

Adhesive for Tin Labels.

Linoleate of magnesia is dissolved in methylated spirits, turps, or white spirits, to a consistency that will not run. Tint it the same colour as the lacquer, applying the label immediately the agglutinant is spread on it.

Gum for Fixing Labels on Metal.

The three following solutions are mixed just before use, the metal being warmed at the time of labelling: (1) Hot bone glue is mixed with 1 per cent. of oil of turpentine and boiled for fifteen minutes to an hour; (2) 3 parts of camphor are dissolved in 4 parts of alcohol; (3) four parts of powdered casein are mixed with 100 parts of water and dissolved therein by the aid of 10 parts of ammonia, without boiling.

Adhesives for Tin Labels.

To fix paper to tin, take (*a*) gum tragacanth, 1 oz.; gum acacia, 4 oz.; thymol, 14 grains; glycerine, 4 oz.; water, sufficient to make 2 pints. Dissolve the gums in 1 pint of water, strain, and add the glycerine in which the thymol is suspended; shake well, and add sufficient water to make 2 pints. This separates on standing, but a single shake mixes it sufficiently for use. (*b*) Rye flour, 8 oz.; powdered acacia, 1 oz.; glycerine, 2 oz.; oil of cloves, 40 drops; water, a sufficient quantity. Rub the rye flour and acacia to a smooth paste with 8 oz. of cold water, strain through cheese cloth, and pour into 1 pint of boiling water, and continue the heat until as thick as desired. When nearly cold add the glycerine and oil of cloves. For an "enamel" use an amber or celluloid varnish.

Other recipes will be found in *Sealing Waxes, Wafers and Other Adhesives*. By H. C. Standage. Price 5s. net. (Scott, Greenwood & Son.)

A useful book for those interested in Glues is *Glue and Glue Testing*. By S. Rideal, D.Sc. (Lond.). Price 10s. 6d .net. Scott, Greenwood & Son.

SECTION VIII.

WRITING, MARKING, ENDORSING, STENCIL AND OTHER INKS, SEALING-WAX AND OFFICE REQUISITES.

Ink.

For making a good writing ink:—

	Oz.
Blue Aleppo galls (coarsely powdered)	8
Logwood (in thin chips)	4
Gum arabic (powdered)	3
Copper sulphate	1
Sugar-candy	1

Boil the galls and logwood together in 12 lb. of water for an hour, or till half of it has evaporated. Strain the decoction through a hair sieve or linen cloth, and add the other ingredients. Stir the mixture till the whole, especially the gum, is dissolved, after which leave it to settle for twenty-four hours. Then decant into bottles of stone or glass, and cork them well.

Ink.

	Lb.
Bruised Aleppo galls	12
Sulphate of iron (green copperas)	5
Gum senegal	5

Dissolve in 12 gallons of water.

Black Ink.

Cost 1½d. per gallon.

	Lb.
Logwood chips	20
Powdered gum	4½
Bichromate of potash	2½
Water	22 gallons.

Method.—Put the logwood into a pan with 20 gallons of the water, bring up to a boil and continue for twenty minutes. At the same time have the gum boiling in the remaining water. When the logwood has boiled for the time stated add the bichromate of potash (powdered), then the gum solution. After boiling and stirring a few more minutes, turn out to cool, then strain.

Superior Office Ink.

Cost 4½d. per gallon.

	Lb.
Powdered blue galls	4
Logwood chips	4
Sulphate of iron	2
Powdered gum arabic	2
Aniline black	½
Soft water	20 gallons.

Method.—Boil the galls, logwood and sulphate of iron in 16 gallons of the water for two hours and strain. In the remaining water the gum should also be dissolved; strain, add aniline black, mix the two together and strain again. The whole will then measure between 15 and 16 gallons of good writing fluid.

Cheap Writing Ink.

Ink black	2 lb.
Liquid laundry blue	2 gallons.
Water	10 gallons.

Boil the water, add ink black and blue, stir well and strain when dissolved. It may be filled into bottles forthwith.

Copying Ink.

	Oz.
Turkish gall nuts in powder	8
Sulphate of iron	4
Gum arabic	2
Alum	1
Vinegar	12
Beer	60

Put all the solids into a stoneware or glass vessel, and pour the vinegar over them, and let the whole digest for twenty-four hours in a moderately warm place, then add the beer and let the rest re-

main undisturbed for a few days or a week, then strain off for use. The vessel should be left uncovered, so that the air can get access to the contents, as it is the oxidising effect of the air on the iron salt that increases its intensity of colour.

Copying Ink.

A good formula consists in boiling 4 oz. of extract of logwood in a mixture of 1 gallon of water and 1 gallon of vinegar with 3 oz. of sulphate of iron, 2 oz. of alum, 2 oz. of gum arabic and 1 oz. of sugar.

Copying Ink.

	Oz.	Gr.
Gall nuts in coarse powder	$3\frac{1}{2}$	0
Extract of logwood	$3\frac{1}{2}$	0
Tormentil root, bruised	50	0
Vinegar	30	0
Water	50	0
Sulphate of iron	18	0
Alum	$3\frac{1}{2}$	0
Water	25	0
Indigo carmine	0	6
White sugar	0	100
Gum arabic	$\frac{1}{10}$	0

Boil the logwood extract and the gall nuts and the tormentil root in the 50 oz. of vinegar, and 50 oz. of water, mixed, for one hour; then strain the fluid, separately dissolve the iron salt and the alum in the 25 parts of water, and mix this with the strained logwood extract, and in the mixture dissolve the indigo carmine, the gum and white sugar.

Copying Ink.

A French formula for a copying ink consists of :—

	Parts by Weight.
Beer	165
Gall nuts	$9\frac{1}{2}$
Gum arabic	3
Calcined sulphate of iron	4
Tormentil root (potentilla tormentilla)	2
Lampblack	1

	Parts by Weight.
Rock-candy	1
White sugar	6
Honey	½

All of the solids are dissolved in the beer, and when the whole of a homogeneous consistency it is ready for use.

Copying Ink.

	Lb.	Oz.
Aleppo galls bruised	2	0
Sulphate of iron (ferrous sulphate)	0	10
Gum arabic	0	8
Sugar	0	10
Extract of logwood	as required	
Water	2 gallons.	

Boil the galls in 1 gallon of water for an hour, using a copper vessel, and replace the water lost by evaporation, strain the fluid, and again boil the galls with the second gallon of water for an hour, and strain, then mix the two quantities of strained fluid, and immediately put in the iron sulphate and the gum, and shake or stir the mixture until these solids are dissolved, and strain the whole through a horse-hair sieve, then put in the sugar in the fluid and a little extract of logwood, to give the ink a blacker colour when first written with.

Copying Ink.

The following is a formula of a bluish-black copying ink :—

	Oz.	Dr.	Gr.
Aleppo galls	4½	0	0
Cloves, pounded or pulverised	0	1	0
Cold water	40	0	0.
Sulphate of iron	1½	0	0
Sulphuric acid	0	0	35
Sulphindigotic acid (in the form of a thin paste, and either entirely neutral or nearly so)	¼	0	0

This ink is prepared by putting the galls and cloves into a vessel capable of holding about 4 gallons. Pour the water on them and allow to digest for a few days, with frequent stirring, then filter off

the fluid into a second vessel of the same size and add the iron salt, and when this has entirely dissolved the acid is added, and the whole quickly shaken. Finally the indigo is put in and mixed by shaking, and then the whole filtered for copying ink.

Copying Ink.

	Lb.	Oz.
Extract of logwood	2½	0
Alum	0	10
Sulphate of copper	0	2½
Sulphate of iron (ferrous sulphate)	0	2½
Brown sugar	0	5
Water	1 pint.	

Boil all the above ingredients in the water until dissolved, then filter through a felt filter bag, and mix it with a solution of 2½ oz. yellow chromate of potash dissolved in 1 pint water, and mix this compound with a solution of 10 oz. sulphindigotic acid in 10 fl. oz. of glycerine. The result is not a cheap ink, but a capital one.

Red Ink.

Cochineal in powder, 1 oz.; hot water, ½ pint; digest, and when quite cold add liquor of ammonia, 1 oz., diluted with 3 or 4 oz. of water; macerate for a few days longer, then decant the clear liquor. Colour, very fine.

Red Ink.

Pure carmine, 12 gr; liquor ammoniae, 3 oz.; dissolve, then add powdered gum, 18 gr.; ½ dram of powdered drop lake may be substituted for the carmine where expense is an object.

Red Ink.

Stale beer, 1 pint; cochineal bruised, 1 dram; gum arabic 1 oz.; ground Brazil wood and alum, of each 2 oz.; boil or macerate with agitation for fourteen days, and strain.

Red Ink.

Ground Brazil wood, 8 oz.; vinegar, 10 pints; macerate for four or five days, boil in a tinned-copper vessel to one half, then add alum, 8 oz., and gum, 3 oz.; dissolve.

Blue Marking Ink.

A solid blue ink, or marking paste, to be used with a brush for stencilling, is made as follows: shellac, 2 oz.; gum arabic, 2 oz.; ultramarine sufficient; borax, 2 oz.; water 25 oz. Boil the borax and shellac in some of the water till they are dissolved, and withdraw from the fire. When the solution has become cold, add the rest of the 25 oz. of water, and the ultramarine. When it is to be used with the stencil, it must be made thicker than when it is to be applied with a marking brush.

A Blue Ink for Use on Glass.

A blue fluid for writing on glass, which is not attacked by water, can be made as follows: shellac, bleached, 10 parts; Venice turpentine, 5 parts; turpentine, 15 parts; indigo in powder, 5 parts. Mix the shellac, Venice turpentine and turpentine, and place in a water-bath under gentle heat, until solution takes place, and then stir in the indigo.

Ink for Writing on Zinc.

Zinc for writing on should be first polished or rubbed with fine emery paper or muriatic acid.

	Oz.	Dr.
Verdigris and sal ammoniac, of each . . .	0	2
Lampblack	0	1
Water	4	0

To be well mixed in a mortar, adding the water gradually. It must be kept in a glass-stoppered bottle for use. Write on the zinc with a quill pen. When once it is dry the writing may be exposed to the weather, or buried in the ground for years, and it will be as legible as when first written.

Blue Ink for Galvanised Ware, Etc.

For a blue ink for writing on galvanised ware or cardboard, dissolve shellac or rosin in a solution of borax until you get a thick enough vehicle; then incorporate your ultramarine blue. The following proportions will do: Shellac, 1 lb.; borax ¼ lb.; water 1 gallon.

Endorsing or Stamp Ink.

Pure aniline Violet 6 B. conc.	$2\frac{1}{2}$ oz.
Beer	1 gallon.
Glycerine	1 gallon.
Fusel oil	1 gallon,

Method.—Heat the beer, add glycerine, then pour fusel oil in, and stir in the colour and strain. This is a good violet. Instead of violet for red ink use 9 oz. Vermiline; for blue, 8 oz. Pure Blue O T; for green, $7\frac{1}{2}$ oz. Malachite green.

Indelible Stamping Ink.

A convenient ink for marking clothing by means of a stamp is the following: 22 parts of carbonate of soda are dissolved in 85 parts of glycerine, and triturated with 20 parts of gum arabic. In a small flask are dissolved 11 parts of nitrate of silver in 20 parts of ammonia. The two solutions are then mixed and heated to boiling. After the liquid has acquired a dark colour, 10 parts of Venetian turpentine are stirred into it. The quantity of glycerine may be varied to suit the size of the letters. After stamping, expose to the sun or apply a hot iron.

Ink for Rubber Stamps.

	Oz.
Aniline red (violet)	20
Glycerine	6
Treacle (half as much as glycerine)	3
Boiling distilled water	5 pints

Violet Endorsing Ink.

	Lb.
Pure aniline violet	$21\frac{1}{2}$
Powdered sugar	$7\frac{1}{2}$

Mix well.

Quantity.—1 oz. to be used to a gallon of the liquid. Best made from glycerine and water.

Ink Powder.

Aleppo galls, 3 lb.; copperas (dry but not calcined), 1 lb.; gum arabic, 6 oz.; white sugar, 2 oz., all in powder, mix. One pint of boiling water, poured on $1\frac{1}{2}$ to 2 oz., makes a pint of ink.

Jetoline Black.

	Lb.
Pure aniline black	5
Finest ivory black	5
Powdered sugar	4

Mix well.

This is more particularly a confectionery colouring, but is good for stains, liquid blackings, etc.

Writing-Ink Black Powder.

	Lb	Oz.
Powdered gum arabic	21	0
Pure aniline black	9	0
Pure violet	0	½

Method.—Thoroughly mix.

Peru Water Black Ink Powder.

	Lb.
Powdered gum	14
Nigrosine	14
Chinese blue	4
Oxalic acid	2
Pure aniline brown	10

Method.—First well mix Chinese blue and oxalic acid, then add the brown, others after.

Blue-Black Ink Powder.

	Lb.
Powdered gum	18
Pure aniline black	10
Chinese blue	2
Oxalic acid	2

Method and quantity as the preceding.

Water Blue Ink Powder.

	Lb.
Gum arabic	28
Methylene blue	8

As above.

Curriers' Ink Black Powder.

	Lb.
Gum arabic	20
Nigrosine	8
Sulphate of iron	5

Method and quantity as before. Curriers' ink is also known as "iron ink" and "striking ink". Apart from the colouring power of the nigrosine when the ink is made up and applied to the leather, the sulphate of iron combines with the tannin in the hide, and so makes a black or dye.

Lithographic Ink.

Mastic in tears, 8 oz.; shellac, 12 oz.; Venice turpentine, 1 oz. melt together; add wax, 1 lb.; tallow 6 oz.; when dissolved further add hard tallow soap in shavings, 6 oz.; and when the whole is combined, add lampblack, 4 oz.; mix well, cool a little, and then pour it into moulds or on a slab, and when cold cut it into square pieces.

Autographic Inks.

1. White wax, 8 oz.; and white soap, 2 to 3 oz.; melt; when well combined add lampblack, 1 oz.; mix well and heat strongly, then add shellac, 2 oz.; again heat strongly, stir well together, cool a little and pour out as before. With this ink lines may be drawn of the finest to the fullest class, without danger of its spreading, and the copy may be kept for years before being transferred.

2. White soap and white wax, of each 10 oz.; mutton suet, 3 oz.; shellac and mastic, of each 5 oz.; lampblack, 3½ oz.; mix as above.

Both the above are used for writing on lithographic paper. When the last one is employed, the transfer must be made within a week.

The above inks are rubbed down with a little water in a cup or saucer for use in the same way as common water-colour cakes or Indian ink. In winter the operation should be performed near the fire, or the saucer should be placed over a basin containing a little warm or tepid water. Either a steel pen or camel's hair pencil may be employed with the ink.

Carbon Duplicating Paper.

For note-books, type machines, etc.

	Lb.
Unsalted lard	46
Japan wax	10
Good lampblack	8
Prussian blue	8

Melt wax and lard, mix the two colours in a dry state, then stir in, mixing free from lumps. While the mass is still hot coat the papers, using a painter's sash tool or other suitable brush. Then remove all superfluous composition from the surface of the papers by means of a sponge.

Copying Paper.

Make a stiff ointment with butter or lard and lampblack, and smear it thinly and evenly over soft writing paper by means of a piece of flannel; then wipe off the redundant portion with a piece of soft rag. Placed on paper, and written on with a style or solid pen. By repeating the arrangement, two or three copies of a letter may be obtained at once. This paper, set up in a case, forms the ordinary "manifold writer".

Lithographic Paper.

Starch, 6 oz.; gum arabic, 2 oz.; alum, 1 oz.; make a strong solution of each separately in hot water, mix, and apply it while still warm to one side of leaves of paper, with a clean painting brush. When dry, a second and a third coat may be given; lastly, press the paper, to make it smooth.

Lithographic Paper.

Give the paper three coats of thin size, one coat of good white starch, and one coat of a solution of gamboge in water, the whole to be applied with a sponge, and each coat to be allowed to dry before the other is applied. The whole of the solutions should be freshly made.

Lithographic paper is used to write on with lithographic ink. The writing may be transferred by simply moistening the back of the paper, and evenly pressing it on the stone, when a reversed

copy is obtained, which may be used to print from, and will yield copies resembling the original writing or drawing.

Lithographic Crayons.

Tallow soap, 7 parts; white wax, 6 parts; melt by a gentle heat and add lampblack, 1 part, and cast into moulds.

To Restore Faded Ink.

Writing rendered illegible by age may be restored by moistening it by means of a feather with an infusion of galls, or a solution of prussiate of potash slightly acidulated with muriatic acid, observing so to apply the liquid as to prevent the ink spreading.

Ink Stains.

Ink stains may be readily removed from white articles by means of a little salts of lemon, diluted muriatic acid, oxalic acid, or tartaric acid, and hot water, or by means of a little solution of chlorine or chloride of lime. The spots should be afterwards thoroughly rinsed in warm water before touching them with soap. Marking ink may be removed by ammonia water, solution of chloride of lime, liquid chlorine, or iodine.

Invisible Ink.

Chloride of cobalt	150 gr.
Distilled water	3 fl. oz.
Glycerine	30 minims.

Dissolve the chloride of cobalt in the distilled water and add the glycerine. Writing executed with this ink is invisible on paper, but on warming the writing turns blue. On exposure to damp air it becomes invisible again.

Marking Ink.

Nitrate of silver, 1 to 2 drams; water, ¾ oz.; dissolve, add as much of the strongest ammonia water as will dissolve the precipitate formed on its first addition, then further add mucilage, 1 or 2 drams; add a little sap green to colour. Writing executed with this ink turns black on being passed over with a hot iron.

Gold Ink.

Honey and gold leaf, equal parts; grind together upon a painter's porphyry slab with a muller, until the gold is reduced to the fines possible state of division, and the mass becomes perfectly homogeneous, when it must be agitated with 20 or 30 times its weight of hot water and then allowed to settle and the water poured off; this process must be repeated with fresh water two or three times, when the gold must be dried and then mixed up with a little weak gum water for use. The brilliancy of writing performed with this ink is considerable, and may be increased by burnishing. Gold ink may also be made by mixing precipitated gold powder with a little gum water.

Ink for Marking Bales.

Best gum arabic, 10 lb.; logwood liquor, sp. gr. 1·09, 3 gallons; fustic extract, 1 lb.; nitrate of iron solution, sp. gr. 1·37, 20 fl. oz.; water, *q.s.* Dissolve the gum arabic in 1 gallon of water, strain and add the logwood liquor, mix thoroughly and let it stand twenty-four hours; then stir in rapidly the bichromate, dissolving in 3 quarts of boiling water. Then add the nitrate of iron and fustic extract. If too thick for use, add lukewarm water until reduced to the proper consistency. The above directions if carefully followed will make a jet-black ink that will leave an indelible mark and will dry quickly. If a blue black is desired, omit the fustic extract and substitute 4 oz. of indigo extract. When no appliance is at hand for determining the specific gravity of the logwood, and the iron liquids, a sufficiently near approximation of the strength and proportions required may be ascertained by a few colorimetric trials. The logwood liquor may be conveniently made by dissolving the extract in water, and the strength can then be easily regulated.

Stencil Ink.

A high class ink for wooden cases, grind ivory-black (bone-black) in the best copal varnish, and thin with turps or white spirit to the right consistency for application with the stencil brush. Instead of copal varnish a cheaper medium might do, say refined rosin oil 48 lb., resinate of manganese 4 lb., dissolve by the aid of heat, and whilst still warm, but not too hot, thin down with 6 gallons of white spirit. If too thick in use thin with more white spirit.

Stencil Ink.

A black stencil ink which will stand the action of rain is prepared by boiling shellac and borax, and stirring in a sufficient quantity of lampblack as pigment. Another preparation which is cheap, durable and possesses a fair amount of gloss, can be made by dissolving 10 parts of gum arabic, 1 part of carbonate of soda, and 1 of glycerine in 40 parts of water, the solution being mixed with lampblack.

Stencil Ink for Iron.

For a stencil ink for galvanised iron sheets use shellac dissolved in borax and tinted with carbon black for black, ultramarine blue for blue, and vermilion for red.

Etching Ink for Glass.

Equal parts of hydrochloric acid, fluoride of ammonia, and dry precipitated barium sulphate are rubbed together in a porcelain mortar. When intimately mixed, the mass is transferred to a dish made of platinum, or gutta-percha, and fuming hydrofluoric acid is poured over it and rapidly stirred with a gutta-percha rod shaped like a pestle, until the impression left by the rod quickly vanishes. Glass written on with this ink is etched immediately, and the etched portions are so beautifully roughened that they are visible at a long distance. The ink only needs to act for fifteen minutes on the glass, and a longer action may be harmful, as the edges lose their sharpness. In making good etching ink, the quality of the barium sulphate is of great consequence. It must be prepared by precipitating the solution of a barium salt (the chloride) with an excess of sulphuric acid, washing well by decantation, filtering, and drying at 248° F. (120° C.). It is only in this manner that it can be obtained sufficiently fine and impalpable.

Concentrated hydrofluoric acid may cause serious inflammation and even ulcers if left in contact with the skin for some time, so that care should be taken both in making and using the ink not to touch it with the fingers.

Shoemakers' Burnishing Ink.

	Oz.	Dr.	Gr.
Extract logwood	4	0	0
Bichromate of potash	0	1	0

		Oz.	Dr.	Gr.
Ferrocyanide of potash	. . . .	0	0	12
Rain water	. . . . . .	as required.		

Apply with brush and immediately burnish with hot iron. Dries black and shiny.

Shoemakers' Burnishing Ink.

	Oz.
Extract logwood	2
Tinct. of iron	2 fl.
Sweet oil	2 fl.
Diluted alcohol	*q.s.*

Mix.

Indian Ink.

Dissolve 6 oz. of isinglass over a fire in double its weight of water. Then dissolve in double its weight of water 1 oz. of Spanish liquorice, and grind it up with an ounce of genuine ivory-black. Add this mixture to the solution of isinglass, while hot, and stir the whole together till all the ingredients be thoroughly incorporated. Evaporate the water in a boiling water-bath, and cast the remaining composition into lead moulds previously greased. This will be of an equally good colour with that of the genuine Indian ink, and the Spanish liquorice will render it easily dissolvable on rubbing with water, to which the isinglass alone proves somewhat reluctant, and prevents its cracking and peeling off from the ground on which it is laid. When this ink is properly prepared, and cast in oblong square moulds, impressed with Chinese characters, so as to have the exact semblance of the genuine Indian ink, it will not be an easy matter to discover the difference.

Indian Ink.

Boil a weak solution of glue at a high temperature in a Papin's digester for two hours, then boil it in an open vessel for one hour more, filter and evaporate to a proper consistence, then make a paste with purified lampblack, adding a few drops of essence of musk and about half as much essence of ambergris to perfume; lastly, mould into cakes, and when dry ornament them with Chinese characters and devices. Quality very superior, does not gelatinise in cold weather like ordinary imitations.

Indian Ink.

Purify lampblack by washing it with potash lye, dry, make it into a thick paste with a solution of glue, mould, and dry.

Indian Ink.

Seed lac, ½ oz.; borax, 1 dram; water, ½ pint; boil to 5 oz.; filter, and make a paste with pure lampblack. Good; when dry it resists the action of water.

Black Sealing-wax.

Shellac, 60 parts; very fine ivory-black reduced to an impalpable powder, 30 parts; Venice turpentine, 20 parts.

Black Sealing-wax, Fine.

Ros n 6 lb.; shellac and Venice turpentine, of each 2 lb.; lampblack, as required.

Black Bottle Wax.

Black rosin, 6½ lb.; beeswax, ½ lb.; finely powdered ivory-black, 1½ lb., melt together.

Sealing-wax.

To make black sealing-wax, take 1 lb. yellow rosin, 5½ oz. of button lac, 5½ oz. of Venice turpentine, and 1 oz. of lampblack or ivory-black. Melt the lac in a copper pan suspended over a clear fire. Add the rosin; add the turpentine slowly and soon afterwards add the black, stirring the mixture all the time. Form into round sticks by rolling on a stone slab by means of a wooden board, or into oval sticks by casting into stone moulds for the purpose. For green, add, instead of black, King's yellow, ½ oz.; Prussian blue, ½ oz.; carbonate of magnesia, moistened with oil of turpentine 1½ drams. For yellow use Chrome yellow, ¾ oz.; and magnesia as before.

Red Sealing-waxes.

1. Light rosin, 60 parts; turpentine, 5 parts; refined tallow, 30 parts; washed chalk, 40 parts; red lead 30 to 40 parts. Melt the rosin and tallow together in a water-bath, then add the turpentine, when well mixed add the chalk and red lead.

2. Rosin, 3 parts; tallow, 5 parts; turpentine, 3 parts; chalk, 4

parts; red lead, 4 parts. Melt the rosin and tallow together in a water-bath, then add the turpentine, when well mixed add the chalk and red lead.

Red Sealing-wax.

Shellac (very pale), 4 oz.; cautiously melt in a bright copper pan over a clear charcoal fire, and when fused add Venice turpentine, 1 oz.; mix, and further add vermilion, 3 oz.; remove the pan from the fire, cool a little, weigh into pieces, and roll them into circular sticks on a warm marble slab by means of a polished wooden block, or it may be poured into moulds while in a state of fusion. Some makers polish the sticks with a rag when quite cold.

Sealing-wax.

Shellac, 3 lb.; Venice turpentine, 19 oz.; finest cinnabar, 2 lb.; mix when hot.

French Sealing-wax.

Shellac (pale), 3 lb.; Venice turpentine, 1¼ lb.; vermilion, 2¾ lb.; divide into sticks, 12, 24, 36 or 40 to the pound.

Red Sealing-wax, Soft.

Beeswax, 8 parts; olive oil, 5 parts; melt and add to Venice turpentine, 15 parts; red lead to colour.

Gold Sealing-wax.

Made by stirring gold-coloured mica spangles or talc, or aurum musivum into melted rosin when it begins to cool.

Green Sealing-wax, Soft.

Beeswax, 8 parts; olive oil, 5 parts; melt and add Venice turpentine, 15 parts; verdigris, powdered, to colour.

Marbled Sealing-wax.

Made by mixing two or three different coloured kinds just as they begin to grow solid.

Black Stencil Paste.

Bone black, 1 lb.; molasses, 8 oz.; sulphuric acid, 4 oz.; dextrine, 2 oz.; water sufficient. Mix the acid with about 2 oz. of water, and add it to the other ingredients previously mixed together. When the effervescence has subsided, enough water is to be added to form a paste of convenient consistency.

Recipes will also be found in *Ink Manufacture*, including Writing, Copying, Lithographic, Marking, Stamping and Laundry Inks. By S. Lehner. Price 5s. net. (Scott, Greenwood & Son.)

SECTION IX.

PREPARATIONS FOR THE LAUNDRY, KITCHEN, STABLE AND GENERAL HOUSEHOLD USES.

Razor Paste.

Levigated oxide of tin (prepared putty powder), 1 oz.; powdered oxalic acid, ¼ oz.; powdered gum, 20 gr.; make it into a stiff paste with water, and evenly and thinly spread it over the strop. With very little friction this paste gives a fine edge to the razor, and its efficiency is still further increased by moistening it.

Razor Paste.

Emery reduced to an impalpable powder, 2 parts; spermaceti ointment, 1 part; mix together and rub it over the strop.

Diamond Razor Paste.

	Lb.
Petroleum jelly	15
Tallow	6
Ground coke	6

Method.—Make into paste, and fill into small tubes.

Razor Paste.

Jewellers' rouge, blacklead, and suet, equal parts; mix while the suet is warm.

Shaving Paste.

White wax, spermaceti and almond oil, of each ½ oz.; melt, and while warm beat in 2 squares of Windsor soap previously reduced to a paste with rose-water.

Silvering Powder.

Silver dust, 1 oz.; common salt and sal ammoniac, of each 4 oz.; corrosive sublimate, ¼ oz.; mix well. Used to silver copper previously well cleaned by friction, adding a little water to form a paste.

Camphorated Chalk, Cretaceous Tooth Powder.

Precipitated chalk, 3 oz.; camphor, 1 oz. Add a few drops of spirits of wine to the camphor, then reduce it to a fine powder, and mix it (perfectly) with the chalk; lastly, pass it through a clean sieve of sufficient fineness.

Tooth Powder.

Red bark and Armenian bole, of each 1 oz.; p
and bicarbonate of soda, of each ½ oz.; oil of cinnamon, 2 or 3 drops; all in fine powder; mix.

Tooth Powder.

Rose pink, 3 lb.; orris powder, ½ lb.; oyster-shells, 2½ lb.; oil of rhodium, 25 drops; mix thoroughly.

oth Powder.

Prepared red coral, 8½ lb.; Venetian red, ¾ lb.; ochre and pumice stone, of each 1 lb.; China musk, 30 grm., all in fine powder; mix.

Tooth Powder.

Cuttlefish bones, 6 oz.; cream of tartar, 1 oz.; orris root, ½ oz.; mix thoroughly.

Tooth Powder.

Cuttlefish bones, 8 oz.; alum and orris root, of each 1 oz.; cream of tartar, 2 oz.; oil of rhodium, 6 drops; mix thoroughly.

Violet Powder.

Powdered starch, 28 lb.; orris root, 1 lb.; essence of bergamot, ¼ oz.; oil of rhodium, ½ dram; mix and pass through a sieve.

Violet Powder.

Powdered starch scented with a little bergamot. Used as a dusting powder in excoriations, and for children.

Lemonade Yellow.

For lemonade crystals and powder, squash, etc.

	Lb.
Icing sugar	40
Pale turmeric	7
Acid yellow aniline	2½

Method.—Mix as above.

Egg Yellow.

	Lb.
Icing sugar	47
Pure aniline orange	3

Method.—Mix well. Water may be used to dissolve a little of the orange in order to colour the whole uniformly. One pint of water will be sufficient.

Sausage Red.

For sausage skins, potted meats, etc.

	Lb.
Ground borax	10
Ground salt	5
Scarlet aniline	2½

Method.—Mix well.

Milk and Butter Colours.

1. Known as "annatto substitute" powder:—

	Lb.	Oz.
Powdered borax	4	0
Chrysoidine orange	4	0
Powdered sugar	1	0
Glycerine	0	2

Method.—Rub all well together.

2. Liquid:—

	Oz.
Oil orange	2
Oil yellow	½
Olive oil	2 gallons.

Method.—Dissolve at a gentle heat.

A very small quantity of either of these considerably improves the colour and attractiveness of milk or butter. All dairymen use something of the kind.

Plate Powder.

Mix and pulverise finely 40 gr. of common salt, and 38 gr. of nitrate of silver. This is suitable for polishing copper and plated goods.

Polishing Paste for all Kinds of Metal.

The following is highly recommended as a first-class cleaner of brass, copper, nickel, etc. Pulverise 1 part by weight of oxalic acid, 15 parts peroxide of iron and 20 parts rotten-stone, mix and sift to remove any and all grit, then grind this with 60 parts palm oil and 4 parts vaseline to a smooth paste. Apply with flannel or other soft cloth and polish in the usual manner.

Red Furniture Polish

	Oz.	Dr.
Turpentine	16	0
Alkanet	0	4
Beeswax	4	0

Method.—Digest the alkanet in the oil until sufficiently coloured, then scrape the beeswax fine and form a homogeneous mixture by digestion over a water-bath. For a pale polish omit the alkanet.

Furniture Varnish.

Dissolve 12 oz. white wax in 1 quart of turpentine by placing a jar containing them in water which is slowly boiled. Heating the ingredients directly over a fire is attended by grave risk.

Glycerine Jelly.

A firm soluble, transparent glycerine jelly for cosmetic purposes is obtained in the following manner: White soap, 4 oz.; pure glycerine, 6 oz.; bleached almond oil, in summer, 3 lb.; in winter, 4 lb.; oil of thyme, 1 dram; of bergamot, 2 drams; of roses, ½ dram.

The soap and glycerine are mixed in a mortar, and the oils are gradually added, according as they are incorporated with the mass.

Lemonade Powder.

	Lb.	Oz.
Castor sugar	200	0
Powdered tartaric acid	25	0
Soluble essence of lemon	0	6
Lemonade yellow	0	¼
Hot water	1 pint.	

Dissolve lemonade yellow in the water, then mix the sugar and acid, and sprinkle the flavouring over, working well. Then pour the colouring over; mix all up well, and rub the colouring in; then pass through a sieve. As the water dries off the stuff gets crusty, and should be broken by again putting through a sieve. About 2 oz. of this in 1½ pints or 1 quart of water makes an excellent lemonade.

Waterproof Composition, for Cabmen, etc.

This is applied with a brush after the manner of a varnish, which it really is. Is used for hats, capes, leggings, cart covers, loin cloths, etc., etc. Usually put up in 1 lb. lever lid tins, or pint cans.

	Lb.	Oz.
Garnet shellac	6	0
Camphor	1	0
Vegetable black	1	0
Prussian blue	0	6
Methylated spirit	3 gallons.	

Crush shellac and camphor, dissolving in the spirit; rub up the colours with a little of the liquid, stir in and strain.

Waterproof Composition, for Cabmen, etc.

	Lb.
Ground black rosin	4
Lampblack (ground in turps)	1
Brunswick black	3 gallons.
Boiled oil	1 gallon.

Mix together, stir up well, and strain when the rosin has dissolved.

Cheap Bottling Wax, Red.

Rosin alone is too brittle, and wax added makes it come expensive, even such a poor article as paraffin wax, but the following is cheap and satisfactory.

	Lb.
Rosin	12
Red ochre	2
Soft soap	½

Melt the rosin in a pan capable of holding a much larger quantity, then add the soft soap, and heat until it has boiled in and the brittleness is toned down. Then stir in the colour. It froths up a good deal upon the addition of either the soap or red ochre, so must be watched, or it may boil over and cause a fire. After cooling down, melt again at a gentle heat, this improving it in the working, and also in appearance.

Curriers' Size.

	Gallons.
Sizing	8
New milk	2
Soft water	1
Tallow or cod oil	1

Boil sizing in the water, strain and incorporate with others. It is then ready to use.

Metal Polishing Paste (White).

	Lb.
Levigated whiting	20
Tallow	18
Cuttlebone	14
Kerosene	½ gallon.

Melt the tallow in the oil, then stir in the others and well grind to a paste. A dash of perfume may be added during grinding if desired, perhaps saffrol or wintergreen would be preferable to the usual mirbane.

Metal Polishing Paste.

Something like "Matchless". No poisonous acids used.

	Lb.
Petroleum jelly	66
Powdered bath-brick	40½

	Lb.
Town tallow	$4\frac{1}{2}$
Stearic acid	18

Liquefy tallow in the petroleum jelly by heating, then stir in the others. Turn out under edge-runners, grinding well.

Metal Polish, No. 2.

	Lb.
"Melted stuff" tallow	82
Powdered bath-brick	25
Precipitated silica	12
Tripoli powder	3
Oleic acid	1

Method.—As before, but adding oleic acid during grinding.

Pink Polishing Paste.

	Lb.
Stauffer's transparent grease	60
Levigated flint	20
Town tallow	12
Powdered pipeclay	10
Powdered bath-brick	9
Oleic acid	1

Tint with Rose Pink.

Melt tallow in the Stauffer's grease by heating; stir in levigated flint, pipeclay, and bath-brick. Turn out under edge-runner grinders, and during the grinding add oleic acid and sufficient colour to tint.

Paste for Cleaning Show Windows.

Cut up fine 2 parts castile soap in 3 parts of boiling water, and dissolve. To the solution add 4 parts of prepared chalk, 3 parts of French chalk and 2 parts of finest tripoli. Stir thoroughly till homogeneous, put into moulds and let set.

Another formula is as follows: 3 parts castile soap, 4 parts boiling water, 2 parts jewellers' rouge, 5 parts prepared chalk and 3 parts bone ash. Mix in a similar manner.

Putz Polishing Paste for Polished Metals.

	Parts.
Liquid cocoanut-oil soap	20
Tripoli powder	2

Milk of Wax.

Dissolve 1 part white wax in a porcelain vessel, when liquid add 1 part spirits of wine of specific gravity 0·830, well stir the ingredients, and pour out upon a large porphyry slab. Convert into a paste with the muller, adding from time to time a little alcohol; when it has a smooth appearance pour into the mixture small quantities of water successively (to the amount of four times the weight of the white wax). Strain through canvas, and it is then ready for use.

Furniture Balls.

Linseed oil, 1 pint; alkanet root, 2 oz.; heat them together until a proper colour be produced; strain, and add yellow wax, $1\frac{1}{4}$ lb., and rosin, 2 oz.

Polishing Wax for Lathe Turners.

Yellow wax 150 parts, rosin 125 parts, and oil of turpentine 125 parts are incorporated by melting the first two ingredients in an enamelled pan, and stirring in the oil of turpentine until the whole is cold.

Wax Finish.

Mix together, with heat, white wax and spirits of turpentine to the consistency of thick paste, when cold apply it to the work with a rag, rub on heavily, so as to fill the pores of the wood, remove the wax from the surface with a wooden scraper made in the shape of a carpenter's chisel, smooth off with a bunch of soft rags by rubbing hard for a few moments, finish with a little French polish applied with a pad. For table tops and all large flat surfaces allow the wax to remain on, and finish with a warm iron by passing lightly and quickly over the work until the wax is made smooth and the surface is sufficiently polished. This is not considered a desirable finish, as it is not durable, and water spoils it very easily.

Floor Wax.

Make a solution of best beeswax; you can dissolve the wax in water if you add pearlash to it. The method of doing this is to take soft water to the amount of about fifteen times the weight of the wax, then bring the water to the boiling-point and add the pearlash, and when the latter is thoroughly dissolved stir in a quantity of beeswax. The wax must be cut fine and stirred in gradually until it appears to be about the consistency desired for easy spreading with a brush. If it becomes too hard through over boiling, or by long keeping, it can be thinned by the addition of hot water and warming over a stove. Apply the wax to the floor warm. Flow it on with a brush, and when dry polish in the usual manner. When a stain is required mix a little dry colour in the wax emulsion while boiling.

Floor Polish.

The following formulæ are said to yield good floor polishes, which have the added merit of being cheap.—(*a*) Stearin 100 parts, yellow beeswax 25, potassium hydroxide 60, yellow laundry soap 10 parts. Water and colouring matter are added to suit. Heat together until saponification takes place. (*b*) Beeswax (yellow), 25 parts, yellow laundry soap 6, glue 12, soda-ash (80° B.) 25 parts, water and ochre a sufficient quantity. Dissolve the soda-ash in 400 parts of water; add the wax and boil down to 250 parts; then add the soap. Dissolve the glue in 100 parts of hot water, stir in the ochre and mix with the saponified wax.

The following is recommended for light, unstained parquette floors: White wax 75 parts, bleached shellac 75 parts, clear rosin (transparent) 6 parts, turpentine 100 parts, methylated spirit 400 parts. Melt the wax, shellac and rosin together, remove from the fire, let cool down somewhat, and add the turpentine with constant stirring. Warm the alcohol carefully to near the boiling-point—this must be done on a water-bath—then add to the other mixture with rapid and constant stirring. This preparation should be slightly warmed before applying and the floor afterwards polished with woollen cloths.

Cabinet-work Polish.

A fine lustrous polish for delicate work can be made as follows: ½ pint of linseed oil, ½ pint of old ale, the white of an egg, and 1 oz.

of spirits of salt (muriatic acid). Shake well before using. A little to be applied to the face of a soft linen pad, and lightly rubbed for a minute or two over the article to be restored, which should first be rubbed off with an old silk handkerchief. The polish will last any length of time.

Gloss for Oak Wainscot.

Boil 2 quarts strong beer, 1 piece beeswax the size of a walnut, and one spoonful of sugar. Wet the wainscot all over with this mixture by means of a large brush, when dry rub it until bright. If greasy, the wainscot should be previously washed in warm beer.

Furniture Polish.

Beeswax, ½ lb.; alkanet root, ¼ oz.; melt together in a pipkin until the wax is well coloured. Then add ½ gill each of raw linseed oil and spirits of turpentine. Strain through a piece of coarse muslin.

1 oz. white wax, 1 oz. yellow wax, ½ oz. white soap, and 1 pint boiling water. Melt all together in a saucepan over a fire, then pour in a bottle. Apply by rubbing a little on a small space, with a cloth of any kind, rub with a second cloth and polish with a third. This mixture will keep indefinitely and is excellent.

Furniture Polish.

1 part by measure of olive oil, and 2 parts best vinegar. Shake well together and apply with a woollen cloth, after which take a dry woollen cloth and rub vigorously. This is really a renovator rather than a polish, and as such is simple and effective. It is recommended highly by a housewife.

Furniture Polish.

Dissolve 4 oz. best shellac in 2 pints linseed oil and 1 pint spirits of turpentine; when mixed add 4 oz. sulphuric ether and 4 oz. ammonia water; mix thoroughly; shake when using, and apply lightly with a sponge. This is an excellent composition, especially as renovator of tarnished varnish.

Furniture Polish.

Raw linseed oil, 2 pints; methylated spirit, $\frac{1}{2}$ pint; vinegar, $\frac{1}{2}$ pint; butter of antimony, 2 oz.; spirits of turpentine, $\frac{1}{2}$ pint. Shake well before using, and apply with a woollen rubber.

Furniture Polish.

Rosin, 2 oz.; alcohol, 98 per cent., 12 oz.; sulphuric ether, 4 oz.; balsalm of fir, 2 oz.; boiled linseed oil, 8 oz. Mix well together and bottle if desired.

Furniture Cream.

Soft water, 1 gallon; beeswax, 1 lb.; soap, $\frac{1}{4}$ lb.; pearlash, 2 oz. Boil until dissolved. To polish furniture, varnished wood-work, statues, etc., it is diluted with water, and spread upon the surface with a painter's brush, then polished off with a hard brush, cloth or leather.

Hand Softening.

	Dr.	Min.
Borate of soda	2	0
Glycerine	4	0
Lanolin	1	0
Eucalyptol	1	0
Ess. of bitter almonds	0	20

Apply at night and afterwards dust the hands with Indian chestnut flour, and cover with gloves.

Hair Wash.

	Oz.	Dr.
Oil of rosemary	0	1
Oil of lavender	0	1
Tincture of cantharides	$1\frac{1}{2}$	0
Eau-de-Cologne	12	0

Mix.

Hair Oil.

For making hair oil that is not injurious to the hair: castor oil, $\frac{1}{2}$ pint; 95 per cent. alcohol, $\frac{1}{2}$ pint; tincture cantharides, $\frac{1}{2}$ oz.; oil of bergamot, 2 drams. Colour the mixture a pale pink with alkanet root.

Glycerine and Lime-Juice Creams.

1. White wax, ½ oz.; oil of sweet almonds, 8 oz.; dissolve by a gentle heat, and add gradually glycerine, 1 oz.; lime- or lemon-juice or citric acid, 32 gr.; and water 1 oz.; rectified spirit of wine, ½ oz.; water, 2 oz.; essence of lemon, 2 drams; essential oil of almonds, 5 drops.

2. Oil of sweet almonds, ½ oz.; castor oil, 2 oz.; lime water, 2½ oz.; otto of roses, sufficient to flavour.

3. White wax and spermaceti, of each 2 oz.; oil of sweet almonds, 8½ oz.; lime-juice, 6 oz.; glycerate of borax, 2 oz.; essence of lemon, ½ oz.; essence of bergamot, 2 drams. Melt the wax and spermaceti, add the oil and perfume, then shake till cold with the lime-juice and glycerine, previously warmed.

Oil for Baldness.

Salad oil, 1 oz.; oil of origanum, 12 drops; oil of rosemary, 10 drops; oil of lavender, 6 drops; oil of cloves, 2 drops. Mix and shake well together.

Pomade for Baldness.

Beef suet, 1 oz.; tincture of cantharides, 1 teaspoonful; oil of origanum and bergamot, of each 10 drops. Melt the suet, and when nearly cold add the rest, and stir until set.

Lime-Cream Hair Dressing.

	Oz.
Powdered lime	8
Comp. hair oil perfume	¼
Water	3 gallons.
Refined cotton or nut oil	3 gallons.

Dissolve the powdered lime in the water and strain, then mix with the oil and shake until creamy. Then put in the scent, and pack into lime phials. In cold weather the oil must first be warmed, or the produce is liable to separate after a little time.

Glycerine Jelly.

Nelson's refined gelatine, 2 oz.; glycerine, 1½ fl. oz.; solution of camphor in 90 per cent. alcohol, 3 fl. drams; oil of cloves, 4 drops;

egg albumen, *q.s.* Soak the gelatine in distilled or clear soft water for twelve hours, pour off the supernatant fluid. Place the swollen gelatine in a beaker or can standing in boiling water, and when quite liquid allow it to cool to about 120° F. (but not to "set"). Add a little well-beaten white of egg, say about a teaspoonful to every 3 fl. oz. of the gelatine, raise quickly to the boil, and keep it boiling for five or six minutes or rather more. Remove from the fire, but keep in a warm place; wait ten minutes, then filter through fine white flannel, and see if the filtrate is quite clear and brilliant, if not, cool, add a little more of the egg albumen, and repeat the boiling and filtering, etc. When very cold, but before it has set, dissolve the oil of cloves in the camphorated alcohol, add this to the glycerine, and lastly mix this with the bright gelatine solution, pouring the whole, before it solidifies into the bottle in which it is intended to be kept.

Snowflake Dressing.

For white canvas and buckskin footgear, belts, helmets, etc. Will not readily rub off.

	Lb.	Oz.
Pipeclay	3	0
Russian glue	2	0
Yellow soap	0	2
Oxalic acid	0	2
Water	2 gallons.	

Method.—Soak the glue in the water until soft, then heat up until completely dissolved, next add soap and acid, then pipeclay, broken small. Stir up, and when creamy strain and bottle.

A Good Sauce.

	Lb.
Shallots	2½
Cayenne	¾
Salt	4½
Ground cloves	4½
Pimento	4½
Vinegar	6 gallons.
Soy	1½ gallons.

Method.—Add the salt and spices to the vinegar and then the shallots; after standing to steep for a few days, put into a pan and boil for twenty minutes; then add the soy, strain and bottle.

English Soy.

	Lb.
Black treacle	28
Prepared malt extract	24
Salt	14
Pea-flour	4
Warm water	4½ gallons
Genuine mushroom ketchup	1½ gallons.

Make the pea-flour into a paste with water, then add more water until a thin batter free from lumps is produced; then pour this into the whole quantity of water as it is warming; next add the malt extract, stir gently, and keep heated for about ten minutes. Run out into jars or a cask, stir in treacle, salt and ketchup, bung down and stand away for about two weeks, then strain. Soy is the usual foundation of all sauces and relishes.

New India Chutney.

	Lb.	Oz.
Apple jam	28	0
Apple pulp	14	0
Cayenne pepper	6¼	0
Chopped pickled onions	6¼	0
Chopped stoned raisins	6¼	0
Fine salt	3	0
Mustard-seed	3	0
Ground ginger	0	12
Vinegar	3½ gallons.	
Raisin wine	1 gallon.	
Garlic vinegar	½ gallon.	

After washing mustard-seed and removing dirt and grit put all the ingredients into a pan and boil up. When soft enough take out and rub through a fine hair sieve, then bottle off.

British India Chutney.

	Lb.	Oz.
Apple pulp	18	0
Foots sugar	6	0
Cayenne pepper	2½	0
Minced shallots	2½	0
Minced sultanas	2½	0

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	Lb.	Oz.
Minced garlic	0	12
Fine salt	0	10
Mustard-seed	0	10
Vinegar	2 gallons.	

Proceed as last, after preparing ingredients as above directed.

Worcester Sauce.

	Lb.	Oz.
Curry-powder	1¼	0
Minced shallots	1	0
Pimento	1¼	0
Minced garlic	0	10
Salt	0	10
Vinegar	10 gallons.	
Walnut pickle liquor	7½ gallons.	
Mushroom ketchup	5 gallons.	

Boil the vinegar and all ingredients (except ketchup); continue at a sharp boil for twenty minutes, cool, then add the ketchup.

"Digonet's Delight" Sauce.

	Lb.	Oz.
Fine salt	3	0
Shallots	3	0
Pimento	1	0
Cayenne pepper	½	0
Corianders	½	0
Cloves	0	6
Nutmegs	0	4
Cassia	0	4
Water	11 gallons.	
Walnut ketchup	2 gallons.	
Soy	2 gallons.	
Treacle	2 gallons.	
Acetic acid	1 gallon.	

Bruise spices if not already in powder, then boil them in water and acetic acid for twenty minutes; strain, add soy, ketchup, and treacle. Heat up again, keeping just simmering for twenty minutes, then strain and bottle.

Eucalyptus Oil Substitute.

	Lb.	Oz.
Glycerine	20	0
Camphor	5	0
Rectified spirit	0	6
Oil of thyme	0	1
American turps	4 gallons.	

Dissolve camphor in the turps and glycerine by gently warming, then add the rectified spirit with the oil of thyme first dissolved therein. If required tinge a faint green.

Magic Marble Renovator.

	Lb.
Crystal carbonate of soda	80
Kieselguhr	50
Powdered cuttlebone	40

Thoroughly mix. For using, the powder is mixed with water to a paste, applied to the marble with plenty of friction, then washed off and a gloss given with polishing cream.

Knife Cleaning and Sharpening Powder.

	Lb.
Bath-brick	300
Ground silica	100
Cuttlebone	70
Pipeclay	30

All well ground and mixed

Chemical Chimney Cleaner.

	Lb.
Muriate of ammonia	395
Bluestone	350
Coarse salt	300
Saltpetre	244
Silver sand	100
Coke breeze	100

Separately powdered or reduced to granular form, then well mixed and packed in the usual style.

Coal Economising Powder.

	Lb.
Nitrate of potash	100
Sal ammoniac	12
Lampblack	8

Powder and mix. Pack in tins 6 to 8 oz. each. The contents to be dissolved in about 14 gallons of water and then syringed over about 1 ton of coal.

Wall-Paper Cleaner.

	Lb.
Fine dry whiting	112
Wheat flour	112
Maize flour	80
British gum	28

Finely powder and run through a mixing machine, then fill into tins. The directions for use are to mix the contents of a tin with water to form a stiff dough, kneading this well. Then go over the dirty wall paper until clean.

Paraffin Oil Rectifier.

This powder is intended for house lamps, etc., to prevent the oil from smoking and having a disagreeable smell, and to increase and brighten the light.

	Lb.
Powdered naphthalene	52
Fine dry salt	10
Powdered camphor	2

Mix thoroughly and put up in tins or packets. A little to be added to the oil in the lamp or stove, and renewed when this is consumed.

Pharmacists' White Wax.

	Lb.
Bleached beeswax	210
Spermaceti	90

Melt together carefully at a gentle heat, stir and pour out into moulds (round) to make cakes ⅜ of an inch thick when set.

Moth Papers.

	Lb.
Naphthalene	28
Camphor	2
Eucalyptus oil	½

Melt on a water-bath at a low heat, stir, and when quite liquefied dip white blotting-paper into the mixture; dry, and dip again. The usual size of the papers is 6 inches by 4. Then pack in packets of a dozen. If wished, the solution when in the liquid condition may be coloured with any of the oil-soluble aniline colours.

Pet Bird Gravel.

	Cwt.	Lb.
Granulated seashells	2½	0
Silver sand	1	0
Red sand	1	0
Burnt oyster-shells	1	0
Powdered cuttlebone	0	20

Make all quite dry and in fine granular form, and mix well. For economy fine bone-meal may be substituted for the cuttlebone, but it is not so satisfactory.

Block Blacklead.

The following mixing produces a fairly cheap and satisfactory stove polish. The chief fault of cheap blackleads (so the ladies say) is that they look slaty and are too hard. This one may be recommended as soft.

	Cwt.
Kaolin	1½
Austrian blacklead	1½
Lampblack	1¼

Method.—Grind with soap water to a paste, then press and dry. The colour may be made denser by first colouring the soap water with 3 oz. of nigrosine to each gallon.

Cleansing Fluid Ammonia.

	Lb.
Liquid ammonia 880°	18
Soft soap	16

	Lb.
Ground borax	12
Pearlash	4
Water	60 gallons.

Method.—Dissolve the soap, borax and pearlash in the water at a moderate heat, skimming off any froth that arises during the heating; cool down, add the ammonia and bottle off at once.

Household Ammonia Recipes.

(1) Oleic acid 1 oz.; alcohol, 1 oz.; ammonia water, 7 oz.; water to make 1 pint. (2) Soap (in shaving) 2 oz.; potash lye, 1 oz.; ammonia water 2 pints; a little alcohol is sometimes added to make the mixture clear. (3) Sodium carbonate, 20 oz.; ammonia water, 48 oz.; water, 32 oz.; (4) Yellow soap, 10 grs.; borax 1 dr.; stronger ammonia, 6 oz.; water to make 20 oz. (5) Soft soap 2 oz.; borax 4 dr.; stronger ammonia, 7 oz.; water to make 24 oz.

Household Cloudy Ammonia.

	Gallons.
Water	7
Ammonia	4½
Methylated spirit	½
Tallow oil	½
Oil of citronella	3 fl. oz.

Method.—Pour the ammonia into the tallow oil and mix the citronella with the methylated spirit. When the tallow oil is saponified dilute with the water, then add the spirit.

Opalescent Cloudy Ammonia.

	Lb.	Oz.
Bay salt	2	0
Ground borax	2	0
Tincture of quilaija root	0	8 fl.
Water	8 gallons	
Liquid ammonia 880°	1 gallon.	

Method.—Dissolve the salt and borax in the water by boiling; cool, add tincture of quilaija root and ammonia; agitate well, and bottle forthwith.

Cloudy Bath Ammonia.

	Lb.	Oz.
Liquid ammonia 880°	10	0
Ammonia soap	8	0
Carbonate of soda	4	0
Ground borax	1½	0
Oil of bergamot	0	2
Oil of citronella	0	2
Oil of lavender	0	½
Water	20 gallons.	
Methylated spirit	2 pints.	

Method.—Shave up the soap, boil with the water until dissolved, adding the soda and borax and skimming; cool, add the spirit, then the essential oils, and, lastly, add ammonia.

Perfumed Toilet Ammonia.

White curd soap	8 oz.
Water	6 gallons.
Liquid ammonia 880°	2½ pints.
Lavender water	1½ pints.
Oil of citronella	3 fl. dr.

Method.—Dissolve the soap in the water, skim, cool, add ammonia, and, lastly, the citronella and lavender water mixed. Shake up well and fill into bottles at once.

Camphor Cloudy Ammonia.

Camphor	3 lb.
Ground borax	2 lb.
Water	10 gallons.
Liquid ammonia 880°	½ gallon.
Tallow oil	2 gallons.

Method.—Cut up the camphor and dissolve in the tallow oil at a gentle heat; cool, and add ammonia immediately, diluting with the water after the borax has been dissolved therein.

Ammonia Jelly.

Gelatine	7 lb.
Water	12 gallons.
Liquid ammonia 880°	1½ gallons.
Soft soap	20 gallons.

Method.—Boil the soft soap in the water until liquefied, then the gelatine; when dissolved, cool, add the ammonia, and beat up until thoroughly mixed. Then run into tins. This is a good form to sell as a carpet cleaner.

Ammonia Foam.

	Lb.
White curd soap	12
Liquid ammonia 880°	8
Pearlash	4
Soda crystals	4
Lime	4
Starch powder	4
Water	25 gallons.

Method.—Dissolve the lime in the water and strain, then add the soap sliced, soda, pearlash and starch; boil till dissolved, adding ammonia on cooling. This recipe is for a form of condensed cloudy ammonia or more appropriately ammonia foam.

Spot and Stain Remover.

	Gallons.
Methylated spirit 95 per cent.	$12\frac{1}{2}$
Liquid ammonia 880°	$3\frac{3}{4}$
Benzine	$\frac{1}{2}$

Method—Mix and bottle immediately.

Preservative Spray for Incandescent Mantles.

	Lb.	Oz.
Silicate of potash, liquid	$1\frac{3}{4}$	0
Powdered asbestos	0	9
Magnesium oxide	0	9
Whiting	0	6
Water	$1\frac{1}{4}$ gallons	

Method—Dissolve the silicate in the water, then mix up well with others. This is packed into small bottles for sale at 1s. each.

The label should read something like this: This highly incandescent fluid sprayed over mantles will greatly increase the brilliancy of the light, in addition to trebling the strength and therefore the life of the mantle. One bottle contains sufficient for twenty-four

mantles, and a mantle treated as directed will outlast three unprepared ones. It obviates trouble of renewing and the expense of new mantles.

Graphite Stove Polishes.

To prevent blacklead from becoming detached from the metal, in the form of dust, which spreads dirt in the room, the graphite can be made into a paste with dissolved soap and 5-10 per cent. of paraffin or wax. A more convenient form of stove polish is that which is already in a liquid condition, and therefore does not require to be wetted before use. Such a liquid polish can be prepared from any of the following recipes: (1) Crude carnauba wax 10 parts, beeswax 10, dark rosin 5, potash solution (40° B.) 20, lampblack 10, Java graphite 100, water 500 parts. (2) Crude carnauba wax 10 parts, rosin 10, potash solution 10, lampblack 10, graphite 75, water 450 parts. (3) Mineral wax 10 parts, rosin 10, potash solution 10, lampblack 10, graphite 71, water 350 parts. The method of preparation is very simple, and consists in melting the wax and rosin in about an equal quantity of water, and adding the potash solution with care. After the mass has boiled for a short time, the rest of the water is added, the lampblack and graphite being incorporated by careful stirring until the preparation is cold, thereupon it is put into tins or bottles.

Paste Grate-Polish.

	Lb.
Plumbago	80
Lampblack	18
Powdered alum	12
Soft soap	7

Method.—Grind to a paste of suitable consistency with a mixture of water and silicate of soda, equal parts. Then fill into tins.

Dry Glove Cleaner.

	Lb.	Oz.
Powdered cream of tartar	30	0
Quilaija bark	10	0
Whiting	6	0
Russian leather scent	0	$\frac{3}{4}$

Mix all well. To use, apply with a damp flannel or sponge, wearing the dirty glove upon the hand or put it upon a wooden glove hand, and leave to dry.

Glove Cleaning Paste.

	Lb.	Fl. Oz.
Cocoanut oil	22	0
Caustic soda	4½	0
Oil of lavender	0	3½
Water	7 gallons.	

Dissolve caustic soda in the water in a pan, then add the oil, boiling until saponified, and continue steadily heating until pasty Add the scent on cooling, stirring in thoroughly. Then fill into tins. Apply with a sponge or flannel.

Glove Cleaning Paste.

	Parts.
Soap in shavings	25
Water	18
Borax	17
Ammonia	1

Method.—Make into a paste by boiling the soap and borax in the water, then add the ammonia.

Liquid Metal Polish.

	Lb.
Indian or English red	15
Putty powder	9
Powdered bath-brick	3
Rottenstone	2
Flour emery OO.	1½
Oil of citronella	1
	Gallons.
Methylated spirit	4½
American turps	3¾
Liquid ammonia	3
"Testefis" kerosene	15¾

Mix all the liquids, add the others as named, shaking or stirring with each addition.

Liquid Metal Polish.

	Lb.
Oxide of iron	14
Fine whiting	5
Rottenstone	2
Finest flour emery	2
Ground silica	2
Turps	3 gallons.
Lemon-juice	2½ gallons.
Methylated spirit	2½ gallons.

Method.—Finely powder the earthy materials, and mix with the liquids. Agitate the liquid during bottling to prevent the solids settling. It also cleans and polishes glass, etc.

Blacking Fluid for Metals.

A useful fluid for colouring iron and steel goods a dead black may be prepared in the following manner.

	Parts.
Bismuth chloride	1
Mercury bichloride	2
Copper chloride	1
Hydrochloric acid	6
Alcohol	5
Water	50

Before applying the fluid the article to be blacked or bronzed should be clean and free from grease. It may be applied with a brush in boiling water and maintain the temperature for half an hour. If the colour is then not as dark as desired, repeat the operation. After getting the desired colour, the latter is fixed and much improved by placing for a few minutes in a bath of boiling oil, or by coating the surface with oil and heating the object until the oil is driven off.

Penny Violet Powder.

	Cwt.
Terra alba No 2	1½
Starch powder	2½

Mix together well, then pack.

Kalodont.

Soap-powder, 1000 parts; levigated chalk, 1000 parts; glycerine, 1000 parts; carmine, 2 parts; peppermint oil, 100 parts.

To Revive Old French Polish.

Mix in 4 oz. of spirits of wine 2 oz. of vinegar and 1 oz. of linseed oil. Rub on as polish.

Polishing Soap for Silverware.

	Oz.
Castile soap in powder	10
Water	10
Tripoli powder	10
Rouge	5
Prepared chalk	15

Dissolve the soap in the water by boiling it down and then stir in the other ingredients.

Liquid Polish for Silverware.

Mix together :—

	Parts.
Liquid ammonia	1
Water	40
Sodium hypophosphite	4
Ammonium chloride	2

Toilet Pumice Tablets.

	Lb.
Pumice powder	56
Fine plaster of Paris	20
Powdered alum	1½

Method.—Well mix with water to form a paste, then mould into shape. If the colour is not objected to, coke breeze may be wholly or in part substituted for the pumice powder.

Urn-Polishing Powder.

	Lb.
Paris white	24
Powdered rottenstone	12

	Lb.
Oxide of tin	10
Powdered pipeclay	10
Powdered salt	3
Finest flour emery	2

Method.—Mix all together, then sift through a fine sieve.

Metal Polishes.

(1) Soft soap, 30 parts; water, 60; 90 per cent. spirit, 10; bole or Tripoli powder, 80 to 100 parts. (2) Petroleum, 30 parts; olein, 10; caustic soda (30° B.), 4; 90 per cent. spirit, 6; Tripoli, 40 to 50 parts. (3) Petroleum, 50 parts; olein, 15; spirit, 10; ammonia (0·960), 5; infusorial earth (calcined), 20 parts. (4) Benzine 49 parts; olein, 64; spirit, 49; ammonia, 38; white Tripoli, 150 to 200 parts. (5) Petroleum, 2000 parts; olein, 500; water, 500; Tripoli, 2000; spirit, 100; ammonia, 150 parts. (6) Colcothar, 20 parts, levigated infusorial earth, 30; crude vaseline, 50 parts. *Polishing Pomade:* Powdered lignite ash, 200 parts; Vienna lime, 50; colcothar, 50 parts, mixed with stearine oil and green soap to a stiff mass and perfumed with oil of myrrh. *Polishing Powders* for brass and copper: (1) Tartaric acid, 2 parts; white Tripoli, 2; crocus, 1 part. (2) Oxalic acid, 3 parts; chalk, 4; crocus, 1; emery, 1 part. (3) Brickdust, 2 parts; common salt, 1; alum, 1; pumice powder, 3 parts. The powders should be moistened for use.

Polishing Powder for Metals.

	Parts.
Carbonate of magnesia	8
Chalk, elutriated	8
Ferric oxide (red oxide of iron)	13

Mix all together by sifting several times through a fine sieve.

Metal-Polishing Powder.

	Lb.
Dry powdered alum	40
Fine whiting	40
Powdered cuttlebone	20
Levigated chalk	10

Powder all very finely, mixing well.

Metal-Polishing Powder.

	Lb.
Whiting	112
Superphosphate of lime	14
Calcined magnesia	10½
Oxide of iron	3½

Method.—Powder all very finely, then pass through sifting machine to intimately mix and remove any grit.

Stove-Cleaning Paste.

Take beeswax, 2 parts; Japan wax, 1 part; water, 14 parts; potassium carbonate, 0·6 part; graphite, finely subdivided, 3 parts; nigrosin (water soluble), 0·3 part.

Melt the waxes together, stir in the potash dissolved in a very small portion of water, and boil until the mixture becomes homogeneous. Now add the remainder of the water, first heating the same. Let it boil up, then stir in the graphite and nigrosin, remove from fire, and stir until cold.

Window-Polishing Paste.

Take Castile soap, 2 oz.; boiling water, 3 oz.; dissolve and add the following in fine powder: Precipitated chalk, 4 oz.; French chalk, 3 oz.; Tripoli, 2 oz.; mix and reduce with water to the consistency desired.

Window-Cleaning Powder.

	Lb.
Gilders' whiting	56
Precipitated silica	16
Starch powder	14
Cream of tartar	12
Calcined magnesia	10½

Method.—Powder all finely and mix well. The directions for use are to mix the powder to a cream with water or preferably with benzoline, apply with one rag and polish with another. If the windows are steaming, the powder may be applied in the dry state.

Knife-Polish Powder.

	Lb.
Powdered bath-brick	56
Powdered rottenstone	9
Powdered emery	7
Ground coke	78
Sifted superphosphate of lime	20
Emery flour	9
Red ochre	5

Method—Grind all to fine powder, and mix together by repeated sifting.

White Rottenstone.

	Lb.
Kieselguhr	80
Ground silica	20
Powdered pipeclay	14

Mix well.

Ivory-Cleaning Powder.

	Lb.
Kieselguhr	45
Powdered oxalic acid	5

Directions for use.—Mix the powder to a paste with water, apply to the article, rubbing well, then polish with some of the dry powder. This powder is very effective.

Metal-Cleaning Cloths and Dusters.

Metal-cleaning cloths are intended to replace polishing creams and pastes, the cleaning material being incorporated with the fabric (wool or cotton), either by direct impregnation with metal polish, or else by precipitating the polishing ingredient on the fibre by the double decomposition of two solutions. In the former case, the fabric (which must not be dressed) is dipped in water containing in suspension finely powdered emery, brickdust, levigated chalk or the like, the saturated cloths being wrung out and dried. The fine polishing material is retained on the fibre and in the meshes of the fabric. Instead of water, an adhesive solution may be used, this enabling the active ingredient to adhere more firmly, though it makes the cloth stiffer. For example, 6 parts of crushed cabinet-

maker's glue is left to soak in water all night, and is then boiled with more water and diluted to make 100 parts, into which are stirred 6 parts of finest levigated Tripoli, 6 parts of Vienna lime, and 8 parts of brickdust. The cloths are immersed in this mixture and then wrung out and dried. Another method is to dissolve 36 parts of yellow dextrin in 100 parts of warm water, the cloths being immersed, wrung, and piled in heaps. Between each pair of cloths is strewn a suitable amount of a mixture of equal parts of Tripoli and pumice powder, after which they are passed through a wringer and dried. Still another method is to steep the cloths in a solution of water-glass containing an excess of some volatile acid, finely divided silica being formed. For the double-decomposition method two baths are required, the first containing Glauber salt, carbonate of soda or water-glass, whilst the second consists of barium chloride in the first case, and calcium chloride in the other two. The resulting products will be, respectively, barium sulphate, chalk and calcium silicate. The reagents are used in molecular proportions, and after passing the second bath the cloths should be well washed to remove everything but the insoluble deposit of polishing material. According to another method of this kind, the cloths are first passed through warm water, wrung out, and immersed for an hour in a 14 per cent. solution of ferric sulphate. After being rinsed with clean water, they are next boiled in a solution of soap containing kieselguhr, wrung or centrifrugalised, and dried. Cloths treated in this way are specially adapted for polishing oxidised metal. The soap solution is prepared by diluting 20 parts of ammonia (specific gravity 0·960) with 120 parts of water, 40 parts of olein being then run in slowly and stirred, the whole being finally warmed until completely dissolved, whereupon 25 parts of kieselguhr are incorporated by stirring. Impregnated dusters, which always remain damp and therefore retain the dust which they remove from furniture, etc., are prepared by the aid of some hygroscopic substance such as glycerine or non-drying oil. For example, the cloths are soaked for a short time in a warm solution of 25 parts of glycerine and 35 of water, and are then wrung out and dried. Mineral oil can also be used for this purpose in the following manner: Either the cloths are impregnated with a solution of 16½ parts of mineral oil in 50 parts of benzol, and dried in some place where they are not exposed to a fire, or else they are immersed in a mixture of 35 parts of American spindle oil (specific gravity 0·883), 3½ parts of oil of turpentine, and 6½ parts of spirit containing a small quantity of oil of bergamot,

rosemary or lavender, the surplus liquid being afterwards removed by squeezing the cloths between rollers.

Rust Remover.

For cleaning rusty grates, acids are unsuitable, but good results are obtained by rubbing the rusty metal with a mixture of grease and pumice or emery powder, *e.g.*, powdered pumice, 40 parts; fine emery, 20; petroleum, 5; olein, 25; ceresin, 6 to 8 parts. The ceresin and olein are melted, and after the pan has been taken off the fire, the petroleum, emery and pumice are stirred in until the mass has thickened, whereupon it is poured into tins. A little amyl acetate may be added to mask the smell of the petroleum.

Plate Powder for Silverware.

	Oz.
Jewellers' rouge	1
Carbonate of magnesia	12

Mix and sift together.

Wool Fat Pomade.

	Lb.	Oz.
Refined castor oil	63	0
Refined wool fat	17	0
Yellow wax	10	0
Comp. hair oil perfume	0	6

Method.—Melt the wax (which should be beeswax free from adulteration), then pour in the castor oil and add the wool fat, continuing heating gently until dissolved, then strain while liquid, and stir in perfume when nearly setting, then fill into pots.

Lip Cosmetic.

Ammonia, 60 parts; carmine, 35 parts; rose extract, 70 parts; rosewater, 2000 parts. The finely powdered carmine is left to digest for a week in the ammonia, and the other materials added and shaken up at intervals during another week.

Beetle and Cockroach Powder.

	Lb.
Powdered borax	30
Powdered sugar	30

	Lb.
Powdered liquorice root	15
Powdered senna	10
Powdered fennel	5

Well mix. To be sprinkled about the holes of the pests.

Dalmatian Insect Powder.

	Lb.
Ground pyrethrums	80
Ground sumach	28
Dry yellow ochre	4

Mix together and run through a fine sieve to break lumps and also to keep back the coarse parts of the sumach; then pack.

Insecticide.

An effective and easily manufactured insecticide is made by dissolving 2½ lb. of best soft soap in boiling water, and making up the solution to 10 gallons, stirring all the time; this constitutes the stock solution, and may be diluted 50 per cent or more, according to the hardness of the water; the solution when ready for use must foam readily when stirred. A useful hint when using hard water as the dilutant is to recommend adding a handful of common washing soda to every 10 gallons of water, stirring, and then adding the insecticide. Poisonous preparations are used for killing leaf-eating insects, such as caterpillars and beetles, which, owing to a protective skin, the ordinary insecticide will not effect. An incredibly small amount of poison will kill large quantities of insects, but great care is necessary when spraying the plants and trees, otherwise the foliage will be burnt; a caution should be given when fruit trees and edible plants are sprayed, to allow six days before gathering for consumption after spraying. The poisons usually met with are Paris green, lead arsenate, hellebore, tobacco and pyrethum. An effective insecticide is made by using Paris green paste or powder, 1 oz. to 10 gallons of water; the solution should be kept well stirred whilst using it, and be applied with a fine light spray.

Cheapened Rouge and Crocus.

	Lb.
Jewellers' rouge (or Crocus)	20
Terra alba No. 3	8

White Polishing Rouge.

	Lb.
Precipitated silica	112
Powdered tartaric acid	10

Mix together and sift thoroughly to effect more complete admixture.

Prepared Fuller's Earth.

	Cwt.
Dark levigated earth	3½
Terra alba	1¾
Tinct. orris to perfume.	

Mix earth and terra alba thoroughly, adding a dash of scent whilst so doing until sufficiently perfumed; then pack into the chip boxes. It costs an average of one shilling per gross for the stuff.

Rot-Proofing Solution for Canvas and Dry Rot.

Kill muriatic acid with zinc, and steep the canvas or wood in a mixture of 1 of solution to 10 of water.

Saddle Paste.

	Lb.
Carnauba wax	56
Soft soap	30
Town tallow	28
Turps	3 gallons.
Neat's-foot oil	¾ gallon.

Method.—Run down the wax, soap and tallow; when melted stir in the neat's-foot oil, and the turps on cooling; then run into tins whilst liquid.

Cheap Harness Oil.

	Lb.	Oz.
Rosin	2	0
Vegetable black (in turps)	1	0
Liquid gum arabic	1	0
Oil, dark blue	0	2
Mineral colza	1 gallon.	
Cotton oil	1 ,,	
Rosin oil	1 ,,	
Rosin spirit	1 ,,	

Dissolve the rosin in the liquids by heating on a water-bath, add the gum, colour with oil blue, then stir in vegetable black, and strain.

Harness Blacking.

A good blacking for a working harness, which is to be applied with a sponge and polished with a brush, is prepared as follows, and should be applied at least once a week. Melt 4 oz. of mutton suet with 12 oz. of beeswax, then add 12 oz. of sugar-candy, 4 oz. of soft soap dissolved in water, and 2 oz. of fine powdered indigo. This, when well mixed, is thinned out with half a pint of turpentine.

Harness Polish.

Glue, 4 oz.; vinegar, 1½ pints; gum arabic, 2 oz.; black ink, 8 oz.; isinglass, 2 drams. Break the glue in pieces, put in a basin, and pour over it about a pint of the vinegar, let it stand until it becomes soft. Mix the gum in another vessel with the ink and allow to stand until it is dissolved; melt the isinglass in as much water as will cover it, which may be easily done by placing the cup containing it near the fire about an hour before you want to use it. To mix them pour the remaining vinegar with the softened glue into a sand pan upon a gentle fire, stirring it until it is perfectly dissolved that it may not burn on the bottom, being careful not to let it reach the boiling-point, about 82° C. is the best heat. Next add the gum, let it reach the same heat again, add the isinglass. Take from the fire and pour it off for use. So use it put as much as is required in a saucer, heat it sufficiently to make it fluid, and apply a thin coat with a piece of dry sponge. If the article is dried quickly it will have a better polish.

Furniture Oil Gloss.

	Gallons.
Pale raw linseed oil	5
Shellac polish	2½
Wood naphtha	2½
Acetic acid	¼

Method.—Mix together, shake up well, and bottle off.

Furniture Oil Gloss.

	Gallons.
Water	4
Nut oil	3½

	Gallons.
Mineral lubricating oil	$1\frac{1}{2}$
Acetic acid	$\frac{1}{2}$
Powdered gum arabic	48

Method.—Boil the gum in the water until dissolved, strain and emulsify with the others. This polishes and revives both the wood and leather-work.

Universal Polishing Cream.

This cleans and polishes leather goods, cycle parts, furniture plate, and all other metals.

	Lb.	Oz.
Japan wax	2	0
White Windsor soap	0	6
Jewellers' rouge	0	4
Stearic acid	0	$2\frac{1}{2}$
Water	1 gallon.	
Turps	$\frac{1}{4}$ "	

Method.—Boil the soap in the water and add the stearic aci shave up the wax and melt with the turps; mix together, stirri well until emulsified; add the rouge during stirring. Then pa into glass pots with metal caps.

Cream La Reine.

Almond oil, 500 parts; spermaceti, 45 parts; white wax, 40 part Tolu balsam, 50 parts; rosewater, 125 parts.

Glycerine Cream.

Almond oil, 500 parts; spermaceti, 200 parts; white wax, parts; glycerine, 85 parts; bergamot oil, 3 parts.

Lanoline Cream.

Lanoline, 250 parts; water, 200 parts; zinc oxide, 50 parts; almond oil, 250 parts; flowers of sulphur, 80 parts; extract of violets, 120 parts.

Cheapened Laundry Borax.

	Lb.
Ground borax	100
Terra alba No. 1	35

Liquid Satinette Linen Polish.

	Lb.
Glycerine	1¼
Ground borax	1
Ground pale shellac	½
Spermaceti	½
Water	1½ gallons.

Boil the shellac and borax in half of the water until dissolved, then strain. Return to the fire, add the other ingredients and boil steadily until dissolved. Then bottle off.

Directions.—Add 3 or 4 teaspoonfuls of the liquid to ½ lb. of boiled starch.

Laundry Gloss Jelly.

	Lb.	Oz.
White soap	1¾	0
Borax	0	4
Lump sugar	0	4
Glycerine	0	4
Oleine	0	4
Powdered white gum	0	4
Water	4 gallons.	

Slice the soap and boil with all other ingredients in the water for about twenty-five minutes, then run out through a fine strainer, filling into tins or bottles. To use this to the articles a little of the gloss is applied with a piece of flannel, and the article is then finished off with the iron.

Starch Glaze Powder.

	Lb.
Powdered borax	21
Potato flour	8
Salt	7
White dextrine	1½

Mix all together and pack in envelopes, 1 oz. in each. This has to be added to 1½ pints or 1 quart of made starch.

Glossy Combination Starch.

	Lb.
Potato starch	100
Powdered borax	7

	Lb.
Powdered white wax	2½
Powdered white soap	1½
Carbonate of soda	1

Have all in fine powder, then thoroughly mix together. To be used as ordinary starch, but without any addition of borax or other gloss or stiffener.

Laundry Glaze Oil.

Three parts of gelatine are dissolved in 100 parts of water, and mixed with a preparation obtained by boiling 10 parts of powdered stearine, 50 of powdered borax, 300 parts of water, and 80 of glycerine. When cold the product forms a homogeneous white emulsion, which is applied to linen with a soft sponge, and produces a glossy surface on being ironed.

Laundry Starch Polish.

	Parts.
Stearine	25
Spermaceti	200
White wax	100

Laundry Cold Water Starch.

The following is superior to even the finest rice starch. In use it neither spots nor causes the iron to stick. It also gives a good gloss, thereby requiring no added gloss or stiffener.

	Cwt.
Sago flour	5¼
Rice starch	2¼
Baked-fine salt	1½
Dry ground borax	1½
White dextrine	1½

Mix well together, having the articles very dry.

Directions for use.—Stir sufficient cold water into the required amount of the starch to make a stiff paste, then dilute to usual consistency with boiling water, but do not boil the mixture as this is unnecessary.

Liquid Cold Water Laundry Starch.

	Lb.
Sago flour	20
Fine salt	8
White dextrine	4
Glycerine	4
Distilled water	$3\frac{1}{4}$ gallons.

Well mix the first three by sifting together; then rub up with the glycerine and water mixed, avoiding lumps; then bottle. It is ready for use, and requires no boiling by the laundress.

Superior Laundry Blue.

	Lb.
Good ultramarine blue	36
Carbonate of soda	30
Liquid glucose	7
Soluble blue	1

Make into a dough with sufficient water, mixing thoroughly, then press to shape, and dry.

Liquid Laundry Blue.

	Lb.
Oxalic acid	$1\frac{3}{4}$
China blue	2
Water	14 gallons.

Dissolve the blue and acid in 4 gallons of the water (boiling), then stand until cold and strain through muslin. The rest of the water may then be added cold. This liquid blue is quite free from sediment and of a nice colour and strength. It may be diluted with much more water than the quantity given, and will then colour water sufficiently for laundry use.

Laundry Blues.

For Soluble Blues.—Take 1 oz. of soft Prussian blue, powder it, put in a bottle with 1 quart of clean rain-water and add $\frac{1}{4}$ oz. of oxalic acid. Or mix 4 parts of Chinese blue, 1 part of Turnbull's blue, and 1 part of oxalic acid, gradually add boiling water until the whole is dissolved, then add lastly 4 parts of indigo extract. The latter is made by treating 1 part of indigo with 4 parts of sulphuric acid, and neutralising with carbonate of ammonia.

Liquid Laundry Blue.

	Lb.
Oxalic acid	1
Chinese blue	2
Water	12 gallons.

Method.—Boil up just sufficient of the water to cover the blue, and then let this be for not less than six hours to give the acid time to do its work well, then pour 1½ gallons of the water (boiling) on, and stand away until next day; then add the rest of the water after boiling, stir and strain twice when cold. Those who try this will have no fault to find, and may send the blue out without worrying whether it will come back.

The utmost quantity of water that may be used is just 16 gallons, after that down goes the blue, thrown out of solution by too much water.

Detergent Cream.

Carnauba wax residue 5 parts, bleached beeswax 5, white ceresine 10, white paraffin 15, oil of turpentine 65 parts. The waxes are melted in a jacketed pan, and the oil of turpentine is stirred in as a thin stream, the mixture being stirred till cold and then put into small boxes.

Painters' Cream.

Pale nut oil, 6 oz.; mastic, 1 oz.; dissolve, add sugar of lead, ¼ oz., previously ground in the least possible quantity of oil; then add water gradually until it acquires the consistence of cream, working it well all the time. Used by painters to cover their work when they are obliged to leave it for some time; it may be washed off with a sponge and water.

SECTION X.

DISINFECTANT PREPARATIONS AND SHEEP DIPS.

Non-Poisonous Disinfectants.

	Lb.
Rosin spirit	740
Water	240
Powdered rosin	140
Soft soap	80
Caustic soda	40

Dissolve the soda in the water, then add the rosin and boil until completely dissolved, occasionally stirring; then add the soft soap, boiling down to about 280 lb., then cool down and pour the rosin spirit in, stirring thoroughly. Cover over until cold.

Non-Poisonous Disinfectants.

	Lb.
Crude rosin spirit	690
Water	240
Powdered rosin	112
Rosin oil	50
Caustic soda	40
Soft soap	18

Dissolve the soda in the water and boil rosin as before, also boiling in the oil and soft soap. Then lower the heat, evaporate until reduced to about 350 lb., then pour in rosin spirit as above.

Disinfecting and Fumigating Oil.

	Lb.	Fl. Oz.
Naphthalene	28	0
Oil of cassia	0	8
Rosin spirit	10 gallons.	

Melt the naphthalene by gentle heat, then carefully pour in the rosin spirit (warmed). Strain and add the cassia oil. Is also a good insecticide for gardeners, etc.

Non-Poisonous Ozonised Fluid.

Dissolve permanganate of potash crystals 2 lb. in water 9½ gallons.

Sanitary Soluble Creosote.

	Cwt.	Lb.
Common rosin (ground)	2	0
Commercial caustic soda	0	50
Water	40 gallons.	
Crude creosote (tar oil)	35 gallons.	

Method.—Boil caustic soda in 15 gallons of the water to form a lye, then add the rosin, boiling until dissolved and saponified, then pour the remaining water in by degrees, and add about 20 gallons of the creosote; stir well, and lessen the heat, then pour the remaining tar oil into the pan, stir, cover over, cool down; then fill cans and drums. It perfectly emulsifies when mixed with water.

Sanitary Carbolic Fluid.

Turns milky upon the addition of water. These disinfectants are really rosin soaps.

	Lb.
Common rosin	18
Commercial caustic soda	4
Crude carbolic acid (30 per cent.)	7 gallons.
Water	2½ gallons.

Method.—Add the soda to water, and boil to dissolve, then add the rosin (powdered), and continue boiling until saponified, and all is perfectly dissolved. Take particular care it does not boil over, as it froths very much as it boils. Keep boiling hard until reduced to about 3 gallons, then pour in 4 gallons of the carbolic liquid, stir well, and let down the heat a bit, then add the remaining fluid, stir a few minutes, then run out. This makes a good carbolic sheep dip also, 1 quart to be added to 20 gallons of water are proportions that will prove effective for this purpose.

Solid Soluble Pink Disinfectant.

	Lb.
Naphthalene	180
Soft soap	40

Tint with oil scarlet.

Method.—Run down the naphthalene in a large pan by a little heat, adding the soap when the former liquefies; when the soap has mainly dissolved, vigorously stir to emulsify them; cool, add the colour, stirring about to make it uniform, then run out into frames or moulds and cut up to required sizes. This kind of thing is intended for use in cisterns, sinks, etc., and gradually dissolves, impregnating all water that passes.

Pink Sanitary Sawdust.

This is much used at cattle and live stock shows, and is put into the pens as bedding for the smaller animals.

	Gallons.
Water	50
Sanitary carbolic fluid	28
Turps	5
Coarse pine sawdust	1 ton.

Method.—Stir the turps into the carbolic fluid, then make a milky emulsion by adding the water, and pour this over the wood dust mixing quickly so as to better distribute. To give the colour, the fluid may be first mixed with about 2 lb. of magenta, or other aniline red, or the latter may be dissolved in a tank containing a good supply of water, and the wood dyed in this, and dried before the disinfectant is added.

Sanitary Powder.

	Cwt.
Ground soda crystals	$2\frac{1}{2}$
Ground alum	$\frac{1}{2}$
Soluble creosote	2 gallons.
Pure turps	$\frac{1}{2}$ gallon.

Method.—Mix the liquids, then distribute over the powdered alum and soda and pack into packets, or tins which is better.

Sanitary Powder.

	Lb.
Chloride of lime	490
Ground naphthalene	70
Genuine turps	1½ gallons.
Eucalyptus oil	1 pint.

Method.—Mix the oil with the turps, then add to the two others, and pass through a sieve to mix them well. It is something like Sanitas powder.

Pink Carbolic Powder.

	Cwt.	Lb.
Cheap earthy base	10	0
Red ochre	0	30
Soluble creosote	12 gallons.	

Method as above.

Pink Carbolic Powder.

	Cwt.	Lb.
Calcined clay or cheap earth	19½	0
Red ochre	0	75
Carbolic acid (95 to 97 per cent.)	34 gallons.	

Method.—Mix as before.

Pink Carbolic Powder.

	Ton.	Lb.
Calcined gypsum	1	0
Red ochre	0	66
Crude carbolic acid (30 per cent.)	30 gallons.	

Method.—Make a "bay" of the gypsum, as in making mortar, mixing up with the acid; spread out to dry, and run through a sieve after adding the red ochre. This is fairly cheap, and may be made cheaper still if crude creosote be used in place of the acid.

Antiseptic Hoof Grease.

Yellow ceresine 10 parts, neutral wool fat 25, oil of turpentine 5, crude carbolic acid 5, spindle oil (sp. gr. 0·900-5) 55 parts. The ceresine, fat and mineral oil are melted together, the carbolic acid being then stirred in and followed by the oil of turpentine when the mixture has cooled down a short time.

Sheep Dips.

These sheep dip prescriptions have been approved of by the Board of Agriculture.

The first is the lime and sulphur dip. For this 25 lb. of flowers of sulphur are mixed with 12½ lb. of good quicklime. Pound or rub the mixture with water till a smooth cream without lumps is obtained. Transfer this to a boiler capable of boiling 20 gallons; add to the mixture sufficient water to make up 20 gallons; boil and stir for half an hour. The liquid should then be of a dark red colour, if yellowish continue the boiling until the dark red colour is obtained, keeping the amount of liquid up to 20 gallons by adding water as necessary. Half the above quantities may be used to make 10 gallons if more convenient. After the liquid has cooled, pour it off from any small quantity of insoluble sediment. To 20 gallons of the mixture add 80 gallons of water to make a bath. This mixture will keep good for twenty-four hours if kept in a covered vessel, and for a month, or even more, if kept in jars or drums securely corked. Period of immersion of sheep in this dip should not be less than half a minute.

The second dip is made of carbolic acid and soft soap. Dissolve 5 lb. of good soft soap, with gentle warming, in three quarts of liquid carbolic acid (containing not less than 97 per cent. of real tar acid), and mix the liquid with 100 gallons of water to make a bath. This mixture after being prepared will keep good for three months if kept in securely stoppered jars or drums in a cool place. The period of immersion for sheep in this dip should not be less than half a minute.

The other dip is that composed of tobacco and sulphur. Steep 35 lb. of finely ground tobacco (known as offal tobacco) in 21 gallons of water for four days. Strain off the liquid and remove the last portions of the extract by pressing the remaining tobacco. Mix the whole extract and add to it 10 lb. of flowers of sulphur. Stir the mixture well, to secure its being evenly mixed, and add sufficient water to make up 100 gallons for the bath. This mixture will not keep. The period of immersion should be not less than half a minute.

SECTION XI.

LEATHER GREASES, VARNISHES, DRESSINGS, POLISHES, ETC.

Recipes for Leather Grease.

(1) Paraffin wax 8 parts, ceresine 5, neutral wool fat 30, train oil 20, mineral oil 40, gum solution about 5 parts; (2) paraffin wax 7 parts, ceresine 8, train oil 10, mineral oil 75 parts; (3) slaked lime 6 parts, rosin stock oil 6, thin blue rosin oil 40 parts, mineral oil 40 parts. The ingredients are melted together at a moderate heat. When lime is used this substance is stirred to a thin pap with a portion of the mineral oil and passed through a fine sieve, the rest of the mineral oil being added and followed by the rosin oil, the whole being stirred until the mass becomes thick.

Greases for Chrome Leather.

After being freed from acid by washing and by neutralising agents, chrome-tanned leather requires greasing to prevent shrinking and keep it supple, from 5 to 10 per cent. of fat being the permissible limits. The fat is preferable applied in the form of an emulsion, which may be prepared from castor oil, neat's-foot oil, olive oil, rape oil, linseed oil, cottonseed oil, sesame oil, ground-nut oil, fish oil, dégras, Soja bean oil, sulphonated olive or castor oil, wool fat, or mineral oils, egg yolk being sometimes used as well. The emulsion is prepared by mixing hard or soft soap with the oils or fats, or by saponifying a portion of the latter with alkali, this process furnishing a product containing about 70 per cent. of total fatty acids, though some of the commercial preparations do not contain more than 20 per cent. The chief features desired of such greases are, that they shall have a neutral or only slightly alkaline reaction, contain sufficient neutral fat to render the leather supple and form a good stable emulsion when mixed with water and fatty

oils, without the percentage of fatty acids or soaps being unduly raised at the expense of neutral fat.

Cheap Dubbin or Leather Grease.

	Gallons.
Mineral lubricating oil	23
Cotton oil	8
Water	5
Crude cod oil	4
Powdered lime	1½ lb.

Casein Shoe Cream.

Casein exhibits the property of furnishing with thick turpentine a handsome shining compound suitable for various purposes, especially shoe polishes. For this purpose 4 parts of galipot are melted, strained through a sieve, and boiled with 3 parts of water and 2 of caustic soda lye (density 37° B.) until a film has formed on the surface, thereupon another 1 part of the soda lye and 50 to 60 parts of warm water are added; 15 parts of soda crystals are dissolved in the liquid, and 10 parts of powdered casein are stirred in until dissolved. This is followed by 10 parts of grey carnauba wax, and the whole is boiled until homogeneous. If a cooled sample be found too stiff, a little water is added. An aniline dye that is fast to alkali may be used for colouring.

Russet Leather Cream.

	Lb.	Oz.
Carnauba wax	40	0
Hard brown Windsor soap	4	0
Phosphine substitute	0	1¼
Water	10 gallons.	
Turps	10 ,,	
Sperm oil	½ gallon.	

Shave up the soap and boil in the water, melt the wax and sperm oil, then remove from fire, stir in turps and phosphine. Mix the solutions and vigorously stir to amalgamate.

Tan Leather Cream.

	Lb.	Oz.
Gum arabic (liquid)	2¼	0
Bismarck brown	0	1¾
Skim milk	5 gallons.	
Lemon juice	2½ pints.	

Method.—Mix and add colour, stirring up well, then bottle.

Directions for use.—Apply with a sponge or clean rag, then clean off and polish with a piece of flannel or a brush.

Best Brown Leather Varnish.

	Qr.	Lb.	Oz.
Garnet shellac	1	4	0
Venice turpentine	0	7	0
Bismarck brown	0	0	4
Methylated spirit	9 gallons.		

Gold Varnish for Leather.

Mix ½ gallon turpentine, 8 oz. gum sandarac, 8 oz. orange shellac, 8 drams dragon's blood, 4 oz. of Venice turpentine, and a small quantity of gamboge and turmeric. Put them into a bottle, then shake well, let it settle, pour off and use the clear liquor.

Deep Black Leather Varnish.

Take manila copal, ground, 30 parts; sandarac, ground, 91; Venice turpentine 5; castor oil, commercial, 5; nigrosin, alcohol soluble, 6; alcohol, 95 per cent., 150 parts. Dissolve the Sandarac and copal in 125 parts of the alcohol (in manufacturing on a large scale this is done in a revolving cylinder moved by appropriate machinery). Heat the Venice turpentine and castor oil (the sort used in the arts) together in a pot and stir till a homogeneous mixture is obtained, then add to the alcoholic solution of rosins and stir well together. Warm the remaining alcohol on a water-bath to about 30° C. (86° F.)., and in it dissolve the nigrosin. Strain the varnish through linen, and to the colate add the solution of nigrosin and stir until homogeneous. Set aside for two weeks and then carefully draw off into bottles and tins.

Leather Varnish.

Although less popular than formerly, since the introduction of shoe creams, leather varnish is still sold in considerable quantities, and if properly made will not injure the leather, provided it is applied as a thin coating. A varnish of this kind may be prepared of shellac 100 parts, gum sandarac 25, Venice turpentine 25, pale rosin 25, castor oil 20, nigrosin (soluble in spirit) 15, spirit 790

parts. The rosins and colouring matter are placed in a shaking cask, and shaken up along with the spirit until dissolved, the varnish being then strained through linen and bottled.

Finest Black Leather Varnish.

	Lb.	Oz.
Shellac	46	3
Sandarac	22	0
Venice turpentine	7	$10\frac{1}{4}$
Camphor	3	$4\frac{1}{4}$
Spirit black	1	2
Methylated spirit at 64°	63 quarts.	

The spirit black is stirred up to a thin paste with spirit, and then poured into the other ingredients.

Varnish for Fine Leather Goods.

	Lb.	Oz.
Shellac	44	0
Sandarac	22	0
Venice turpentine	7	$10\frac{1}{4}$
Camphor	3	$4\frac{1}{4}$
Oil of lavender	35 fl. oz.	
Methylated spirit	63 quarts.	

Black Leather Varnish.

A very good black varnish is made by boiling 40 lb. of linseed oil with 16 lb. of litharge for about five hours, and then colouring with lampblack.

Shoe Polish Recipes.

Turpentine creams: (1) Grey carnauba wax, 10 parts; paraffin scale (m.p. 50 to 52° C.), 23; oil of turpentine, 70 parts. (2) Mineral wax, 26 parts; paraffin scale, 13; oil of turpentine, 61 parts. Saponified creams: (1) Grey carnauba wax, 5 parts; beeswax, 5; Japan wax, 8; carbonate of potash, 5; water, 80 to 85 parts. (2) Carnauba wax residue, 5 parts; Japan wax, 5; rosin, 3; paraffin, 7; carbonate of potash, 5; water, 80 to 85 parts. (3) Mineral wax, 12 parts; paraffin, 2; rosin 1; carnauba wax residue, 2; carbonate of potash, 4; water, 80 parts. The saponified creams are prepared by melting the wax in an open pan. The alkali is dissolved in one half of the water and the warm solution is stirred into the melted

wax, taking care not to add too much at a time, or the mixture will froth up unduly. Heating must be continued until a uniform emulsion is obtained, thereupon the rest of the (warmed) water is added and the mass warmed until once more uniform. When saponifiable waxes alone are used the cream may be poured into bottles or tins whilst warm, but with a large proportion of unsaponifiable wax the mass must be stirred until fairly thick. These saponified creams must be protected from cold during transport and storage, or they are liable to freeze in the cold weather, and the ingredients separate out on thawing.

Polishes for Leather.

The following formula for a leather polish given by a Continental Trade Journal seems to be capable of practical application: Boil in a capacious receptacle four and a half kilos of linseed oil, with 250 grammes of finely pulverised polish for two hours. This must then be allowed to stand for two days to become clear. The oil poured off from the sediment is again boiled and four kilos of yellow wax is added to the same, gradually, in small quantities. The heating is proceeded with, until a sample, extracted and tested, has so much solidity in the cool state that it lends itself to the formation of a ball. When this condition has been attained, stir into the mixture one and half kilos of finely ground lampblack, and let the whole cool; it can, it is said, be moulded into any required shape. Another good varnish for coloured leather and shoes is prepared as follows: Dissolve 300 grammes of yellow wax in one litre of turpentine in a suitable vessel. In another dissolve 120 grammes of soap in one litre of water. Both solutions are then shaken up together and stirred until cold. To every 30 grammes of this emulsion add three-tenths of a gramme of suitable colour, such as for instance Nanking brown, dissolved in one and a half centimetres of spirit. This polish is said to be very economical and effective, and is to be applied sparingly with a sponge to the leather. After it is dry rub off with a clean woollen rag.

Brilliant Gloss for Boots.

	Lb.	Oz.
Kid leather cuttings	3	0
Sugar	0	8
Russian glue	0	4

	Lb.	Oz.
Tallow	0	2
Pure black	0	6
Water	2½ gallons.	

Soak the leather and glue in the water overnight. Next day boil up until dissolved, add the other ingredients, continuing to heat steadily until in solution, then strain and bottle. This is self-polishing, and is applied with a brush or sponge.

Condensed Tan Boot Polish.

	Lb.	Oz.	Dr.
Carnauba wax	9	0	0
Unbleached palm oil	7	0	0
Paraffin wax	3	0	0
Mirbane	0	4	0
Phosphine substitute	0	0	2
Genuine turps	3 gallons.		

Shred waxes, dissolve in turps on a water-bath at a gentle heat, stir in palm oil, colour with the phosphine, and stir in the mirbane on cooling.

Russian Cream Polish.

	Lb.
Crude glycerine	1¾
Brazilian wax	1
Hard white curd soap	12
Bismarck brown R	½
Water	1 gallon.
Turps	¾ gallon.

Norfolk Leather Fluid.

Linseed oil, 3 pints; yellow rosin, 4 oz.; fir rosin, 2 oz.; yellow wax, 12 oz.; melt, add neat's-foot oil, 1 quart; oil of turpentine, 1 pint. Used to preserve and soften leather.

Polishing Waterproof Dubbin.

	Lb.
Ceresine wax	30
Sugar-candy	30
Lampblack	10
Soft soap	10

	Lb.
Mutton tallow	10
Rosin	7
Carnauba wax	7
Chinese blue	1
Rosin spirit	4 gallons.

Rub up lampblack free from lumps with the rosin spirit, melt all the others, adding Chinese blue when liquefied, stir, cool, then add turps and black, pouring into tins while liquid.

This preparation will give a fair polish when brushed, and will not prevent any after application of blacking from shining, as most of the ordinary boot dubbins do.

Black Dubbin.

	Lb.
Black rosin	50
Carnauba wax	28
Vegetable black	10
Neat's-foot oil	11 gallons.
Tallow oil	11 ,,
Linseed oil	11 ,,

As before, after rubbing up the black to a paste with some of the oil; then add the other ingredients, stirring well.

These are genuine leather softeners.

Boot and Shoe Polishes and Varnishes.

A leather varnish or polish is prepared by mixing a solution of 80 parts of shellac in 15 parts of alcohol, 3 parts of wax, 2 parts of castor oil, and a sufficient quantity of pigment.

Another boot varnish is made by dissolving 150 parts of wax and 15 parts of tallow in a mixture of 200 parts of linseed oil, 20 parts of litharge and 100 parts of molasses, at a temperature of 230° or 250° F. After this 103 parts of lampblack are added, and when cold it is diluted with 280 parts of spirits of turpentine, and finally is mixed with a solution of 5 parts of gum lac, 2 parts of aniline violet in 35 parts of alcohol.

Another kind is made by melting 20 parts of beeswax, or ceresine, 30 parts of spermaceti, and 250 parts of spirits of turpentine, with 201 parts of asphalt varnish, and adding 10 parts of borax; 20 parts of lampblack, 10 parts of Prussian blue, and 5 parts of nitro-benzol.

Shoe Blacking.

French shoe dressing is :—

	Oz.	Dr.
Glue, fine	4	0
Logwood chips	8	0
Powdered indigo	0	2
Bichromate potassium	0	4
Tragacanth	0	4
Glycerine	4	0
Vinegar	2 pints.	
Soft water	1 pint.	

Boil together, strain and bottle.

Shoe Blacking.

Shoe blacking free from sulphuric acid is made as follows : Boil extract of logwood, 1 part, and bruised nut gall, 30 parts, with twenty-five times their weight of strong vinegar, express the liquid, add copperas, 8 parts; and set aside for twenty-four hours, decant the clear liquid and add gum arabic, 8 parts; rock-candy, 100 parts, and syrup, 8 parts; strain and mix with methylated spirit, 50 parts, and, finally, powdered indigo, 40 parts.

Shoe Blacking.

	Parts.
Molasses	4
Ivory-black	5
Olive oil	8

Rub together in a Wedgewood mortar until all the ingredients form a perfectly smooth homogeneous mixture, then add a little lemon-juice or strong vinegar, say the juice of one lemon or about a wineglass of strong vinegar, and thoroughly incorporate, with just enough water added slowly to regain the required consistency.

Shoe Blacking.

	Parts.
Rapeseed oil	2
Syrup	5
Water	10
Ivory-black	10

Mix and add while stirring 5 parts of sulphuric acid, and finally 5 parts more of water.

Blacking.

A brilliant paste blacking may be prepared by mixing 2 lb ivory-black, 6 lb. molasses, 1¼ lb. each of olive oil and sulphuric acid, and enough water to reduce the product to the proper consistence.

Boot Blacking.

Ten parts of bone black, 10 parts of glucose syrup, 5 parts of sulphuric acid, 20 parts of train oil, 4 parts of water and two parts of carbonate of soda. The bone black and glucose are stirred with the acid in a porcelain vessel until the whole mass is homogeneous and has a shining black surface when at rest. The soda is dissolved in a little water, and boiled with the oil under constant stirring until it forms a thick liquid, and then the other mixture is stirred into it. By varying the proportions of these two mixtures, the blacking is made thinner and softer or harder and firmer. In this and all other kinds of shoe blacking made with bone black and sulphuric acid, the precaution must be observed of stirring rapidly and evenly after the acid is added, otherwise lumps will be formed that are difficult to crush, and the blacking will have a granular condition that does not belong to it. Good shoe blacking must always remain soft, and show a smooth uniform surface when applied to the leather.

Nubian Blacking.

The formula specified in the English patent reads as follows:—

	Parts.
Camphor	11
Venice turpentine	16
Shellac	36
Aniline blue	15
Bismarck brown	15
Alcohol	926

Dissolve.

Boot Paste Blacking.

Warren's blacking: bone black, 16 lb.; linseed oil, 4 lb.; sulphuric acid, 4 lb.; treacle, 16 lb.; gum senegal, 8 oz.; copperas, 1 oz.; spirits of wine, 8 oz.; vinegar (brown) 12 pints.

Blacking Without Acid.

Mix thoroughly $3\frac{1}{2}$ lb. vegetable black, $1\frac{1}{2}$ lb. ivory-black, 5 lb. each of molasses and glycerine, melt, and, when fluid, add 20 oz. of olive oil, and afterwards 2 oz. of stearine; stir while hot, and then add 10 oz. of gum senegal dissolved in 3 quarts of water. This may be kept as stock, and for use diluted with about three times its bulk of warm water.

India-rubber Blacking Liquid.

Ivory-black, 60 lb.; treacle, 45 lb.; gum (dissolved), 1 lb.; vinegar, 20 gallons; oil of vitriol, 24 lb.; India-rubber oil 9 lb.; mix.

The India-rubber oil is made of caoutchouc, 18 oz., dissolved in rape oil, 9 lb., by means of heat. The ingredients are mixed together in the same order and manner as common blacking.

Blacking Balls.

Beeswax, 8 oz.; rosin, 1 oz.; tallow, $\frac{1}{2}$ oz.; melt together, then add gum arabic, $1\frac{1}{2}$ oz., dissolved in water, 2 oz., and as much lampblack as necessary to colour; stir until nearly cold, then run into tin moulds.

Blacking Balls.

Lard and wax, each 1 oz.; ivory-black, lampblack, and brown sugar, of each 8 oz.; best glue size, 4 oz.; mix well and mould into balls.

Blacking Balls.

Ivory-black, 16 oz.; gum tragacanth, 2 oz.; sugar-candy, 4 oz.; water, 16 oz.; mix with heat, and mould into balls.

Blacking Balls.

Ivory-black and lampblack, of each 16 oz.; thick mucilage of gum arabic, 7 oz.; brown sugar, 6 oz.; melted glue, 1 oz.; water, 1 quart; make into balls.

Blacking Balls.

Suet, 4 oz.; beeswax and sweet oil, 1 oz. each; sugar-candy and gum arabic, both in fine powder, 1 dram each; melt together over a slow fire, then add 1 tablespoonful of turpentine and enough lampblack to produce a good colour; mould into balls or cakes. Use for black leather.

Military Blacking Balls.

In the army it is against the regulations for the men to apply any of the self-polishing Nubian style of blackings to their belts, pouches, etc., and they use the following balls, carrying the stuff into the leather with a bone or bottle, and in time get a surface almost as good as patent leather.

	Lb.
Vegetable black	9
Yellow wax	4½
Lard	1½
Powdered gum arabic	1½
Colza oil	3 gallons.

Melt the wax, gum and lard with the colza oil, then add the black, stirring well. Then mould into balls about 2 oz. in weight.

Boot-black Powder.

	Lb.
Powdered gum	14
Nigrosine	10
Water black	6
Chinese blue	1½

Method.—Thoroughly mix the colours together, then incorporate with the gum arabic.

New Kid Reviver.

	Oz.
Soap	14
Pure black	12
Milk	2 gallons.
Water	1¾ „
Painters' size	1½ „

Dissolve the size and soap in the mixed milk and water by warming, then stir in the colour and strain.

Kid Reviver, Black, Powder.

	Lb.
Powdered gum	30
Pure aniline black	24
Oxalic acid	2½
Chinese blue	1½

Method.—Mix by grinding together dry.

Boot Polish, Green, Powder.

	Lb.
Chinese blue	10
Pure aniline orange	10
Dextrine	7
Oxalic acid	4
Orange	2

Method as above.

Tan, Cream-colour, Powder.

	Lb.
Powdered rosin or sugar	28
Pure Bismarck brown	5
Phosphine	3
Orange	3

As before. This is soluble in oils, turps, spirit or water.

Military Leather Paste.

For military boots, saddles, pouches, etc.

	Lb.
Brazilian wax	20
Yellow ceresine	20
Japan wax.	12
Rosin spirit 875°	2½ gallons.

Method.—Melt the waxes; remove from the fire and stir in the rosin spirit when cool; then pour into the tins.

Sportsmen's Brown Liquid Waterproof Dubbin.

	Lb.	Oz.
Carnauba wax	40	0
Amber rosin	37½	0
Phosphine substitute	0	4
Linseed oil	12 gallons.	
Tallow oil	10 ,,	
Neat's-foot oil	10 ,,	

Slice wax and powder rosin, then boil in the oils till dissolved, adding the phosphine to colour. Apply warm.

Black Leather Enamel.

	Cwt.	Qr.	Lb.
Garnet shellac	1	0	0
Dark Manila	0	2	0
Castor oil	0	0	1
Methylated spirit	35 gallons.		

Nigrosine spirit black, to colour.

Colourless Glaze for Glacé Kid Leather.

A colourless glaze, suitable for black and coloured glacé kid, and in good demand among boot manufacturers, is made by dissolving 10 to 12 parts of borax in 100 parts of boiling water, adding 100 parts of milk curd, the mixture being maintained at about 80° C. in a jacketed enamelled pan. A similar product can be prepared by the cold process, the borax being replaced by a corresponding amount of ammonia and the ingredients shaken up in the cask. This glaze, which is thick, and must be kept in wide-necked bottles, is useful for restoring the gloss to kid that has become dull, and it may be coloured as desired.

Recipes will also be found in *The Leather Worker's Manual.* By H. C. Standage. Price 7s. 6d. net. (Scott, Greenwood & Son.)

The Manufacture of Lubricants, Shoe Polishes and Leather Dressings. By R. Brunner. Price 7s. 6d. net. (Scott, Greenwood & Son.)

SECTION XII.

MISCELLANEOUS PREPARATIONS.

Silvering Glass.

A mixture is prepared of 1 part of ammonia, 2 parts nitrate of silver, 3 parts water and 3 of alcohol; this solution is filtered and mixed with ¼ part of grape sugar (dissolved in weak spirit). At about 70° this liquid deposits upon the surface of glass a mirror of silver (which, however, it is difficult to obtain faultless when deposited upon large surfaces).

Silvering Mirrors.

		Oz.	Gr.
(*a*)	Nitrate of silver	0	175
	Distilled water	10	0
(*b*)	Nitrate of ammonium	0	262
	Distilled water	10	0
(*c*)	Pure caustic potash	1	0
	Distilled water	10	0
(*d*)	Pure sugar-candy	½	0 (av.)
	Distilled water	5	0

Dissolve, and add 50 gr. of tartaric acid; boil in a flask for ten minutes, and when cool add alcohol, 1 oz.; and distilled water, *q.s.* to make up to 10 oz. For use take equal parts of *a* and *b* and mix together; also equal parts of *c* and *d* and mix in another measure. Then mix both these mixtures together in the silvering vessel and suspend the mirror face downwards in the solution.

Blackening Brass.

Take 1 oz. of strongest nitric acid, and add to it, in a large jam-pot placed in the open air, some copper filings or thin sheet copper, about ¼ oz.; stir frequently with a stick or glass rod; allow to stand

for an hour, then pour off the solu . . . Copper Nitrate, Poison". Clean the metal well with fine emery paper, well wash and dry, suspend it by a piece of thin copper wire, and dip it into the solution for about thirty seconds, then heat over a spirit flame or bunsen gas burner till it blackens; if not black enough, repeat the operation. When quite black, rub with a soft cloth, and with a rag dipp . . . linseed oil, and dry.

Bronze Powders.

Mix together sulphate of copper, 100 parts; carbonate of soda, 60 parts; apply heat until they unite into a mass, then cool, powder, and add copper filings, 15 parts; well mix, and keep them at a white heat for twenty minutes; then cool, powder, and wash and dry.

Gold-coloured Powder.

Verdigris, 8 oz.; putty powder, 4 oz.; borax and nitre, of each 2 oz.; bichloride of mercury, $\frac{1}{4}$ oz.; make them into a paste with oil and fuse them together. Used in japanning as a gold colour.

Lead Powder.

Dutch lead reduced to an impalpable powder by grinding.

Iron-coloured Powder.

Plumbago finely powdered.

Silver-white Powder.

Melt together 1 oz. each of bismuth and tin, then add 1 oz. of running quicksilver; cool and powder.

Etching Fluid.

Verdigris, common salt, and sal ammoniac, of each 4 oz.; alum, 1 oz. (all in powder); strong vinegar, 8 oz.; water, 1 lb.; dissolve by boiling for a moment; cool, and decant the clear liquid.

Etching Fluid for Steel.

Iodine, 1 oz.; iron filings, $\frac{1}{2}$ dram; water, 4 oz.; mix and dissolve.

Etching Fluid for Steel or Copper.

Pyroligneous acid, 4 oz.; alcohol, 1 oz.; mix and add nitric acid 1 oz.; all by measure.

Prevention of Rust on Machinery.

To keep machinery from rusting take ½ oz. of camphor, dissolve in 1 lb. of melted lard, take off the scum, and mix in as much fine blacklead as will give it an iron colour. Clean the machinery, and smear with this mixture. After twenty-four hours rub clean with a soft linen cloth. It will keep clean for months under ordinary circumstances.

Varnish To Prevent Rust.

Mix with fat oil varnish ⅗ of well-rectified spirits of turpentine. The varnish is to be applied by means of a sponge, and articles varnished in this manner will retain their metallic brilliancy, and never contract any spots of rust. It may be applied to copper, and the preservation of philosophical instruments, which, by being brought into contact with water, are liable to lose their splendour, and become tarnished.

Agricultural Spray.

Copper sulphate (bluestone) is the most powerful fungicide known, having a high reputation: it is seldom used alone except on trees that are dormant. A mixture of copper sulphate and lime, the most important fungicide yet discovered and known as "Bordeaux mixture," is used by farmer, fruit-grower and gardener; most agriculturists prefer to manufacture their own Bordeaux mixture, though proprietary "Bordeaux mixtures" are on the market. Copper sulphate used at the rate of 4 oz. in a quart of water is excellent to prevent "smut" in wheat, oats, etc., this quantity is sufficient for a bushel of seeds, and is used generally. Copper sulphate is usually met with as coarse lumps, but it is preferable to use small crystals which dissolve easily, and 98 per cent. purity should be stipulated the quality usually asked for. A caution should be given to dissolve it in wooden or earthenware vessels, the ordinary metal pails decomposing it.

Chemical Guano.

Despite legislation and the passing of various measures relating to manures for the protection of the British agriculturist all the chemical manures are still not wholly genuine. A factitious mixing for a guano, a good fertiliser, but still only what may be regarded as an adulterated article is:—

	Cwt.
Superphosphate	8
Dry umber	7
Chilian guano	5

These are to be well mixed and riddled together, using water if necessary. Then fill into sacks.

Cattle Brand.

Make a mixture in a steam-jacketed pan of equal parts of soft rosin oil and green oil from the gasworks and tint with red raddle for red, blue raddle for blue, and lampblack for black. These should not require any heat in use, as a little petroleum burning oil would easily thin down to right consistency if too thick. If you wish to avoid heating in the making it is just possible that a strong solution of an aniline dye could be used to stir into heavy creosote oil to tint it to the right shade.

Frosting Glass.

Dissolve Rochelle salts in gum arabic water and let it stand about twelve hours. Clean the glass to be frosted well and lay it down flat, if convenient, and flow on the solution, so that it will not run. When about to set take a pointed stick and dot it in rows about an inch or so apart. The solution may be coloured with aniline dyes if desirable, and when dry flow on a thin coat of dammar varnish.

To Silver Brass.

Mix up 1 oz. of common salt, 1 oz. nitrate of silver and 3 oz. of cream of tartar. Moisten it, rub it on the articles with a piece of soft leather, then wash in clean water, and dry in sawdust, then give a coat of transparent varnish.

Green Bronze.

Mix 12 oz. nitrate of iron, 2 oz. nitrate of soda, and 1 pint of water. Dip the articles in this mixture until they have become

the required shade, wash them in clean water, dry, and afterwards dip them in the following mixture: 1 oz. perchloride of iron, and 2 oz. of water. When the articles are quite dry apply a coat of lacquer.

Writing Chalks and Coloured Pencils.

The principal raw material for writing chalk and coloured pencils viz., native carbonate of lime, is frequently unsuitable for direct use, being crystalline, instead of amorphous, and therefore poor in binding and covering power, so that it has to be carefully ground and levigated. An exception is afforded by the French chalk from Champagne the large blocks of which can be sawn direct into pieces ready for use. The levigated chalk is worked in a kneading machine, with an addition of kaolin and an adhesive, such as gum arabic and tragacanth, and the resulting mass is pressed several times in spindle presses. It is then forced through a suitable nozzle by means of a worm press, the issuing rope of material being cut into lengths automatically. The pieces are dried with great care at a temperature of 100 to 112° Fahr. The quantity of added kaolin depends on the more or less crystalline nature of the chalk used, and ranges between 10 and 30 per cent. If this fails to give the desired covering and marking power the mass must be supplemented by a suitable addition of some amorphous material, such as precipitated chalk. Readily soluble gums are the best binding media. If the chalk is to be used as billiard chalk, pumice, alumite, etc., is added; whilst for tailor's chalk the addition of kaolin is considerably increased, soap being also added. Gypsum chalk is also largely used, and is characterised by softness, good covering power, low specific gravity, and ease of preparation. Calcined gypsum is mixed with about 30 per cent. of water (this being about the right quantity to cause it to set properly) and placed in brick-shaped moulds, being carefully dried after hardening, and then cut up with a circular saw. Gypsum chalk, however, has the drawback of low resistance to fracture and pressure, to obviate which the calcined gypsum is incorporated with a moderate proportion of chalk and glue water. Coloured pencils are made of kaolin, chalk, amorphous pigments and a binding medium, the method being the same as for chalk. Any aniline dye used must be fast to light. Pastel crayons, on the other hand, are make of body pigments and wax, ceresine, paraffin, etc., the wax being melted, mixed with the pigment, and moulded.

Coloured Crayons for Box Marking.

The wax basis is made of a mixture of ceresine, 40 parts by weight; bleached carnauba wax, 35; paraffin wax, 20; bleached beeswax, 5; Venetian talc, 50 parts. The colouring materials are as follows: Blue, 12·5 parts of powdered Paris blue; green, 15 parts of dark chrome green; yellow, 15 parts of chrome yellow; red, 15 parts of artificial vermilion; white, 10 parts of zinc oxide; black, 10 parts of lampblack. For the dark colours unbleached waxes may be used. To make the crayons the waxes must be melted and the coloured ingredients incorporated by stirring, the heating and stirring being continued for some time in order to obtain thorough distribution. When partly cooled the mass is moulded in glass tubes, the lower end of which is closed by cork; and when set the crayons are pushed out of the mould and packed in tinfoil after trimming the ends.

Coloured Crayons.

Crayons may be made of any colour or shade by employing suitable pigments and diluting them with a proper quantity of elutriated or prepared chalk. White crayons are made of this substance by simply combining it with a suitable quantity of pure clay, or by mixing it up in either of the ways just described. Black crayons are made of prepared blacklead, ivory-black, and lampblack, etc. Black chalk is frequently made into crayons by simply sawing it into suitably sized pieces. Red crayons have as their colouring ingredients, carmine, carminated lakes, vermilion, and any of the earthy or mineral colours commonly used as pigments. For a superior red crayon, use the softest rouge, elutriated, dried, and made into a paste with water holding in solution a little gum and soap. Blue crayons are made of indigo, smalts, Prussian blue verditer, etc. Green crayons of a mixture of chrome yellow, or yellow ochre, with blues. Yellow crayons of chrome yellow, Naples yellow, yellow ochre, etc. Brown crayons of umber (raw and burnt), sienna (raw and burnt), Cullen's earth, brown ochre, etc., and some peculiar shades of a mixture of black, carmine and either of the above colours. Purple crayons are made with any of the more brilliant blues, mixed with carmine, lake or vermilion.

Writing on Metals.

Take ½ lb. of nitric acid and 1 oz. muriatic acid. Mix and shake well together, and then it is ready for use. Cover the metal to be

written on with melted beeswax. When cold, write the inscription plainly in the wax, clear to the metal, with a sharp instrument. Then apply the mixed acids with a feather, carefully filling each letter. Let it remain from one to ten hours, according to the appearance desired. Then wash and remove the wax.

Artificial Marble.

Artificial marble can be produced by the following receipt. Take equal parts (by weight) of Portland cement, blue lias cement, ashes and marble dust, mix all this with water containing 1 per cent. of borax, allow the mixture to run into moulds and to settle. On the following day the castings are smoothed with sand-paper and painted one after the other in the following order, and each time baked for twenty-four hours, at a heat of 150° to 200° F., smoothing each coating each time, *viz.*, 1, with best varnish; 2, with Pontypool varnish; 3, with pale milk varnish; 4, with copal varnish, and 5, with extra fine polishing varnish. The ground colours are added after the first coat. The marbling is done after the second or third coating.

Imitation Amber.

Roessler's recipe is to melt 1 part of rosin, then add 2 parts, by weight, of shellac. When the mixture becomes sufficiently fluid, 1 part of white rosin, that should be clear as water, is added.

Waterproof Luminous Paper.

For preparing a waterproof paper which will shine in the dark the following mixture is given: 40 parts paper stock, 10 parts phosphorescent powder, 10 parts water, 1 part gelatine, and 1 part bichromate of potash.

Plaster of Paris Moulds.

To make plaster of Paris hard enough for a mould for metal, put 10 per cent. of alum in the water used for mixing the plaster.

Modelling Wax.

Wax for jewellery models is made by working up pure beeswax, either the natural yellow or bleached as desired, in twice its weight of spirits of turpentine. It is coloured sometimes with yellow or red ochre, and sometimes with alkanet. The ochres are put into

the turpentine at the same time as the wax, the alkanet should be steeped in the essence for twelve hours or so before, and the clear-coloured liquid must be decanted off the sediment before use. No heat is used in either case.

The jewellery and allied trades use a variety of cements, the composition of which it may be useful to know.

Copper-Plating Zinc.

To give an appearance of copper to zinc a solution of 15 parts sulphate of copper and 19 parts cyanide of potassium is prepared. To the solution are added 160 parts pipeclay. A pasty mass is thus obtained, with which the object to be coppered is rubbed after having been well cleansed.

Bronzing Zinc.

For bronzing a mixture is prepared with 15 parts verdigris, 19 parts cream of tartar, and 30 parts soda crystals. The mixture is dissolved in sufficient water, and 160 parts pipeclay are added. This mass is applied as stated.

To Loosen Glass Stoppers.

A very common source of trouble and vexation is the fixed stopper of a smelling bottle or decanter, and, as in the case of all frequent evils, many methods have been devised for its remedy. Some of the methods are as follows:—

1. Hold the bottle or decanter firmly in the hand, or between the knees, and gently tap the stopper on all alternate sides, using for the purpose a small piece of wood, and directing the strokes upwards.

2. Plunge the neck of the vessel into hot water, taking care that the water is not hot enough to split the glass. If, after some immersion the stopper is still fixed revert to the first process.

3. Pass a piece of list round the neck of the vessel, which must be held fast while two persons draw the list backwards and forwards; this will warm the glass and often enable the hand to turn the stopper.

4. Warm the neck of the vessel in front of the fire; when it is fairly hot it can generally be moved.

5. Put a few drops of oil round the stopper where it enters the

glass vessel, which may then be warmed before the fire. Next take the decanter or bottle and employ the process No. 1 described above: If it continues fixed, add another drop of oil to the stopper, and place the vessel again before the fire. Then repeat the tapping with the wood. If the stopper still continues immovable give it more oil, warm it afresh, and rub it anew until it gives way, which it is almost sure to do in the end.

6. Take a steel pen or a needle, and run it round the top of the stopper in the angle formed by it and the bottle; then hold the vessel in your left hand and give it a steady twist towards you with the right, and it will often be effectual, as the adhesion is frequently caused by the solidification of matter only at the point nearest the air. If this does not succeed, try process No. 5, which will be facilitated by combining the two methods, Nos. 5 and 6. By this method, stoppers have been extracted which had long been fixed, and given up in despair. Broken stoppers are best left to professional hands.

"Jack Frost."

This is used for Christmas decorations, and upon the clothing at balls, parties, etc. In addition to powdered mica, sublimed naphthalene is suitable. If naphthalene is boiled in a pot with a cover, the fine downy deposit upon the lid should be collected. It has a peculiar property of increasing, as it apparently grows.

To Remove Grease Spots from Marble.

If the spots are fresh, rub them over with a piece of cloth that has been dipped into pulverised china clay, repeating the operation several times, and then brush with soap and water. When the spots are old brush with distilled water, and finest French plaster energetically, then bleach with chloride of lime that is put on a piece of white cloth. If the piece of marble be small enough to admit of doing so, soak it for a few hours in refined benzine.

To Polish Plate Glass.

Rub the surface gently with a clean pad of cotton wool, then cover the pad with cotton velvet, charged with fine rouge, and again rub the glass until it has acquired a beautiful bright polish without scratches.

To Write on Glass.

To make an ink that will write on glass, dissolve some ammonium fluoride in water, and then mix it well with three times its weight of barium sulphate.

Fly Gum.

	Gallons.
Water	$2\frac{1}{2}$
Glucose	$1\frac{1}{2}$
Silicate of soda 1403	1

Thin the silicate with the water, then add the glucose, and fill into tins. This gum is very tenacious and has many advantages over bird-lime or rosin and oil mixtures. It answers well for sticky fly-papers. It must not be omitted to first soak the imitation parchment paper in a solution of alum. As a side line it sells to gardeners for painting round the trunks of trees and shrubs to prevent the ascension of insect pests.

Flux for Soldering.

Classen & Co. make a soldering flux by heating fats with zinc chloride and rosins or resinous products, the mass being stiffened by an addition of paraffin wax, ceresine etc., the whole being thinned down with vaseline for use. This product is claimed to cleanse the metal to be soldered by removing the metallic oxides, grease, scale, and even residual rosin or caoutchouc, and to have the advantage of being entirely free from mineral acids. As an example of the method of preparation, 2 parts of ceresine and 3·5 parts of stearine are heated to 200° C., 3 parts of rosin being added, and heating continued for half-an-hour. Five parts of zinc chloride, mixed to a paste with a little water, are then stirred in, the mass being worked again in the mixer when cold, and formed into sticks or other suit able shapes.

Soldering Powder.

	Lb
Granulated soft solder	16
Fine iron filings	$2\frac{1}{2}$
Powdered sal ammoniac	$1\frac{1}{2}$

Grind the solder about as fine as coffee, then mix well with the others. This will solder without a proper soldering iron, as with a red-hot poker. It is put up in small packets and carded, selling freely.

Prepared Soldering Powder.

	Lb.
Granulated soft solder	21
Ground sal ammoniac	7
Ground rosin	7

Mix well.

Solder which Expands on Cooling.

Lead, 6 lb.; antimony, 9 lb.; bismuth, 1 lb. Used for making metallic joints or fixing metals in marble or stone.

To Prevent Tarnishing of Silver.

Silver may be kept from tarnishing by painting it with a soft brush dipped in alcohol in which some collodion has been dissolved. The coating can be removed by dipping the article in hot water, but it completely protects it from tarnish.

Incombustible Wood.

The following chemical compound is said to have the effect of rendering wood incombustible, petrifying it, as it were, without producing any change in appearance. Intense heat chars the surface, slowly and without flame, but does not penetrate to any extent, and it leaves the fire intact :—

	Lb.
Sulphate of zinc	55
Potash	22
Sulphuric acid of 64° Tw.	22
Water	55

All of the solids are to be poured into an iron boiler containing the water at a temperature of 45° C., or 113° F. As soon as the substances are dissolved the sulphuric acid must be poured in little by little, until all the substances are completely saturated. For the preparation of the wood, it should be placed in a suitable apparatus and arranged in various sizes (according to the purposes for which it is intended) on iron gratings, care being taken that there is a

space of about half an inch between every two pieces of wood. The chemical compound is then pumped into the apparatus, and as soon as the vacant spaces are filled up it is boiled for three hours. The wood is then taken out and laid on a wooden grating in the open air to be rendered solid, after which it is fit for uses of all kinds.

Frosting Tin.

A frosty appearance may be given to sheet tin by a wash of bichloride of tin.

Boiler Covering.

Substances after the style of the well-known Leroy's are produced by such mixtures as :—

	Cwt.	Lb.
Fossil meal	10	0
Fine road dust	10	0
Cow-dung	10	0
Powdered fire-clay	$1\frac{3}{4}$	0
Chaff	0	15
Teased cow-hair	0	7

Intimately mix and pack in sacks.

Directions for use.—Turn out sufficient composition from the sack and mix with water to make it the consistence of mortar. It should be well worked, as this causes it to toughen. Then lay on with a trowel three coats, each one inch thick, one coat to be dry before others are put on.

To Clean Statuary Marble.

2 oz. of carbonate of soda, in one quart of cold water, brush the marble with a clean brush dipped in this solution, rinsing constantly with clean water.

To Remove Smoke Stains from a Ceiling.

Mix starch with cold water to a consistency of ordinary paint and cover the stained places with this. Allow it to remain until quite dry, and then brush off the dry powder. The starch will absorb the dark matter, which may thus be removed. It may be necessary

to make more than one application. This answers admirably for ordinary smoke stains, but where walls or ceilings have been deeply stained by smoke from fire there is no remedy except to scrape the surface and re-coat it.

To Remove Old Enamel Letters from a Window.

Wet the edges with alcohol, and then gently pry edges up with the point of a penknife. Usually the old letters are hardly worth the time taken in removing, as age greatly impairs them, and the removing injures them more or less.

Fireproofing Fabrics.

To fireproof textile fabrics there is probably nothing better than ammonium chloride. Alum solution is also excellent, as well as water-glass. These are probably the cheapest mediums for the purpose to be obtained. Good results are also secured with a solution composed of 4 gallons of water in which is dissolved 40 oz. chloride of ammonia, 40 oz. boracic acid, 5 oz. carbonate of ammonia, 4 oz. potassium bitartrate and 4 oz. potassium oxalate. The fabric is steeped in the solution for fifteen minutes and then dried.

Uninflammable Celluloid.

Clement proposes to render celluloid uninflammable by adding to the dissolved nitrocellulose a substance containing colloidal silica. Ten per cent. of such silica is sufficient to make the celluloid safe, and by increasing the proportion an absolutely incombustibly product can be obtained. The silica is added in the form of a silicious ether, such as ethyl or methyl silicate or di-silicate, prepared by the partial saponification of neutral silica.

Safety Matches.

O. P. Meyer recommends that the igniting composition should be made of chloride of potash, gelatine liquefied by means of acetic acid and finely powdered pumice stone, the whole being coloured with a 1½ per cent. solution of ferric acetate.

Rendering Corks Acid Proof.

The corks are dipped for some time in a solution of 500 parts of gelatine and 24 parts of glycerine, and are then washed with

water and dried, after which they are immersed in a warm mixture of 20 parts of vaseline and 70 parts of paraffin wax for some time. Corks treated in this manner are proof against the action of acids or any other non-solvent liquids, including alkalies.

Rubber Substitute from Linseed Oil.

Sauton purposes to make a rubber substitute by heating 6 parts of gelatine and 6 parts of glycerine until a viscous mass is formed, to which is then added about 1 part of linseed oil, followed by stirring in a mixture of 0·15 part of formaldehyde (or preferably trioxymethylene) and 0·08 part of manganese peroxide, the mass being poured into moulds and left to solidify. A quantity of sulphur, equal to about 10 per cent. of the linseed oil, may be added along with the latter, the moulds in this case being heated to 150° C. for an hour after pouring.

Removing Oil Stains from Marble Statuary.

Make a paste with fuller's earth and hot water, cover the spots with it, let it dry on, and the next day scour it off with soap and water.

Removing Oil Stains from Marble Statuary.

Take 1 lb. soft soap, 1 lb. powdered whiting, 1 oz. soda, and a piece of blue the size of a walnut. Boil all together for a quarter of an hour, and rub over the marble while hot. Leave it on for twenty-four hours at least, then wash off, and polish with a coarse flannel. The above quantity is quite enough for an ordinary mantelpiece.

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